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PSYCHIATRIC RUMINATIONS.

THE PRESIDENTIAL ADDRESS DELIVERED AT THE ONE HUNDRED AND SIXTH ANNUAL MEETING OF THE ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION HELD AT EASTBOURNE, 10 JULY, 1947.

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By time-honoured tradition one of the first duties of your newly-elected President is to inflict upon you a Presidential address. This is at once a very considerable responsibility and a privileged opportunity, but the feelings of awe and apprehension with which I face such a distinguished and erudite audience are mercifully lessened by the knowledge of the unwritten rule of our Association that no outspoken criticism of the subject matter of the address is permitted. I wish to ask you to bear with me, for a few minutes, whilst I put before you what I think may best be termed psychiatric reflections or ruminations, based on a certain amount of experience and, I can say quite sincerely, a true interest in the matters touched upon. I fear, however, that I have little or nothing original to offer you.

It appears to me that the present is a suitable time for something in the nature of a stocktaking of our position both as members of our Association and as psychiatrists—especially as we are shortly to embark upon the great adventure of a comprehensive Mental Health Service within the National Health Service. In our Royal Charter, granted in the 85th year of our Association's existence, and now, it is worthy of note, twenty-one years of age, the objects and purposes for which our Association is constituted are stated to be "for the formation and cultivation of science in relation to Mental Disease and the improvement on the treatment of persons suffering from Mental Disorder and to facilitate the exchange of information and ideas on the subjects amongst the members of the Association and otherwise." The succeeding subsections detail the methods by which the objects and purposes may be furthered: I quote—"by holding Meetings of the Association and Con-

ferences with other Associations in the United Kingdom or elsewhere ; by publishing a periodical journal ; by printing, translating and distributing books or treatises on or connected with science in relation to mental disease or with the treatment of those suffering from mental disorder or with allied sciences ; by expenditure on sending and maintaining in the United Kingdom or elsewhere any person or persons chosen by the Association for the investigation of science in relation to mental disease, treatment of mental disorder or allied subjects, and on inviting any person or persons, desired by the Association, to meetings convened by the Association, and on sending and defraying the expenses of representatives of the Association to any meetings convened for similar objects in any part of the United Kingdom or elsewhere ; by promoting and encouraging the study of science in relation to mental disease, of the scientific treatment of mental disorder and allied subjects by providing, instituting and maintaining lectures, classes, examinations and other means of instruction." These are the main points concerning the aims and objects of our Association to which I wish to draw your particular attention. I make no apology for quoting them and for reminding you of this very comprehensive (although perhaps a little old-fashioned) wording, and especially of the international implications, which you can read for yourselves in the Charter and Bye-Laws, and to which each ordinary member after election subscribes his or her name, thereby promising that he or she will promote the objects of the Association to the best of his or her ability.

During the past 40 years the membership of the Association has much increased in numbers—there are now on the books well over 1,000 names of active ordinary members, representative, I am very pleased to say, of all the branches of psychological medicine. We are all glad to welcome to our membership the recently elected Associate Members who have qualified for such addition to our ranks as being "non-medical members of the learned Professions specially interested in Psychological Medicine and its allied subjects." We take pride also in our Corresponding Members from overseas. The Association has certainly travelled a long way since the days when it was virtually a "closed shop" for those working in mental hospitals of local authorities and in licensed houses—and mainly Superintendents at that! I believe that the prestige and authority of the Association has increased considerably in recent years, that the quality of the papers and discussions at our meetings is of a higher level than ever before, and that the influence of the *Journal of Mental Science* is being steadily raised. That is all on the credit side, but nevertheless this is no time for complacency or for sitting back with halos of self-congratulation over our heads! The recent division of the activities of the Association into administrative committees and scientific sections is, I am sure, a step in the right direction, but we must constantly bear in mind our avowed aims and objects, and endeavour to make certain that we are keeping in step with progressive psychiatry. If we are to claim the right, as we most assuredly should, to speak with an authoritative voice for psychiatry in this country we must, I feel convinced, each of us cultivate a wider outlook concerning our great specialty. As I see it, the one great failing to which any psychiatrist is prone to succumb is narrowness of vision. It is imperative that we should

each be tolerant of our colleagues' work and aims. Quite clearly we cannot be equally expert in each branch of psychological medicine, but we should be able to appreciate all forms of honest psychiatric endeavour. We hear and read far too much of what can only be fairly described as prejudice in connection with some of the methods of treatment now in use—and prejudice is surely no more than emotionally-toned ignorance or (perhaps less crudely and more politely) insufficient knowledge. I should like to make it quite clear that this criticism applies equally to those whose choice of treatment is predominantly by physical methods as to those whose allegiance is mainly to psychotherapy. In our present stage of knowledge it is surely unwise and unpractical to condemn any form of treatment, carried out with all due care and thought for the patient, which has been shown to achieve beneficial results, merely on the grounds that the way in which such results are brought about is only partly understood. It seems to me of the utmost importance that the psychological and physical ways of approach in the treatment of the varying degrees of behaviour disorder should be available, and that it should be recognized that in a high proportion of cases the two methods are complementary—the one being incomplete without the other. I do most sincerely urge that more use should be made of psychotherapeutic methods, of an elastic kind, in the treatment of the cases in our large mental hospitals. For a psychiatrist to have only one type of treatment to offer is surely specialism of a very inferior variety. One of the aims of the Association should be to encourage and to assist our younger members to visit special treatment centres both at home and abroad, and it is to be hoped that in the near future such valuable additional experience may be obtained far more easily than in the past. We have been too insular in our psychiatric outlook, and we ought to ensure that our rising generation of specialists has a reasonable opportunity of becoming familiar with international psychiatric thought and developments. One plea, however, I do put forward, and that is that their case-reports, papers and indeed their spoken contributions should be in plain English. At the present time some of our younger intellectuals make a point of using hybrid polysyllables of ill-mated classical parentage, the results being unpleasing both in form and sound, and certainly not generally understood. It has been well said that "unless one is a genius it is best to aim at being intelligible." It is my opinion that a good deal of the cynicism and prejudice on the part of our medical and surgical colleagues, and also of our legal friends, with regard to matters psychiatric, is brought about by the jargon which finds its way into a certain number of reports signed by psychiatrists. It should be quite possible to describe any case of mental illness using only words to be found in a good English dictionary. I stand firmly for simple language, and I believe that psychiatry will obtain a more sympathetic hearing with the majority of the medical and other learned professions when we speak more plainly. That brings me to the question of our relationship with our professional colleagues, which, I fear, at times tends to be somewhat equivocal and unsatisfactory. It is unfortunately true to say that we are thought by some to make unwarranted claims for psychiatry. It is made plain to us that we should realize that we are only in the process of development, and that we should be content, for the present at any rate, with

a place in the medical world as a minor specialty. I think I cannot do better, in this connection, than quote from the "Memorandum on the Future Organization of the Psychiatric Services," the joint production, issued in 1945, in the preparation of which our Association took a prominent part. I quote, "Where Psychiatry begins and ends has not been settled," and again, "Psychiatry is not a limited specialty. It permeates and influences General Medicine, Surgery, and Obstetrics and Gynaecology." The main difficulty is that in the eyes of some of the older and more conservative of our medical colleagues psychiatry represents simply the treatment of frank cases of mental disorder and of course mainly in mental hospitals or "asylums," which, I regret to say, is still the term used far too often by members of our own profession. It is, therefore, all important that, if possible, we should be able to agree upon a definition which covers the comprehensive modern conception of psychiatry, and at the same time shows its influence on all other branches of medicine. One suggestion, which is surely an over-simplification, has been that psychiatry can be described as "The Personal Aspect of Medicine"—I look upon this as being too vague for our purpose, remembering that it has been said that "A definition is nothing but an abbreviation in which the user of the term defined may please himself!" I venture to put forward as a possibly acceptable solution that "Psychiatry is that branch of medicine which is concerned with the prevention, causation and treatment of deviations of human behaviour." This emphasizes the importance of studying the personality behind the illness, and suggests the contribution which the psychiatric approach may make in cases of somatic illness. On the whole, however, I think that many of us will agree with Edmund Burke, who said, "I have no great opinion of a definition, the celebrated remedy for the disorder of uncertainty and confusion."

"Why is the patient ill?" is, to my mind, a question for which an answer should be sought just as zealously as any other form of investigation. There is a great deal of truth in the old saying that "More patients are ill because they are unhappy than unhappy because they are ill," and it is high time that we gave up dividing illness strictly into the two classes of organic and functional. There is much scope for missionary work in this connection, and I feel that we may have been remiss in the past in not preaching and teaching the importance of the emotional aspect in bodily illness; nevertheless I am persuaded that the younger generation of physicians and surgeons is becoming progressively impressed with the need for a detailed knowledge of the patient's background—home life, employment conditions and social environment—whatever the nature of the symptoms presented may be. This awakening of psychological interest is largely due, I believe, to experience gained in the fighting services and civilian practice will certainly reap the benefit. It is thus becoming established that, however thorough the physical examination of a patient may be, a psychiatric approach is needed as well, and that this may, in a number of cases, provide a clue as to the reasons for the continuance of the patient's invalidism. But we, as professing psychiatrists, must be keenly on our guard lest we become obsessed with the psychogenic view-point and so omit a thorough and careful physical examination of our patients. The anxious subject derives

great confidence from a properly conducted investigation of his bodily symptoms, and without such investigation no course of psychological explanation and reassurance carries much weight or authority. The psychiatrist who disregards the somatic side of the picture is surely not far removed from the ranks of lay psychotherapy. But there is, nevertheless, no doubt that a wise and careful technique is required in the carrying out of the physical examination of the fearful and anxious neurotic. Nothing is more distressingly easy than to suggest additional or exaggerated suspicions or fears of organic disease by a manner which betrays a lack of confidence in one's own findings or by a vague reference to the desirability of further investigation. I feel strongly that the members of the Association have a duty to perform to the general public by spreading the gospel of the modern conception of psychiatry. I am a believer in the dissemination of knowledge—yes, of medical knowledge—which is based on scientific and proven facts. In this field it should be our aim to further the preventive side of psychiatry by instituting lectures and by providing suitable literature for the public. There is accumulating evidence that such enlightenment would be welcomed. Teachers, clergy, parents and adolescents are all groups for whom organized efforts on our part are overdue. For some time past there has been a ready sale for weekly and monthly periodicals exhibited on the bookstalls, which offer short-cut cures for the inferiority complex, blushing, shyness, frigidity and even yet more intimate handicaps at remarkably low cost. My view is that we as psychiatrists should not be content to leave this position as it is. The knowledge of the main fundamental facts concerning the autonomic nervous system and the endocrine glands linked with elementary medical psychology and explained with psychiatric insight would, in my opinion, prove a real buttress to many otherwise vulnerable and susceptible personalities. The opportunity of providing teachers with suitable material for handing on to their adolescent pupils is of particular interest at the present time. With the addition of a year's school life at the most impressionable age (14 to 15 years) for the vast majority of the children, the possibilities of education for character are immense—character being defined as human nature in its highest form.

In these days when broken homes and unfortunate or indifferent parental influence are so common, the duties, obligations and discipline of adult life, if inculcated at all, must in many cases be learnt in school or in social clubs, and the responsibility of the teacher or social leader is very great. I wonder if it is stretching a point too far if we see here the possible clue to the increasing number of adolescent and young adult anti-social personalities which have caused so much concern in the Services. I look upon these young men and women as being sentimentally immature and without any true character formation. They have no sense of altruism, and live on the fringe of society as "lone wolves" prompted by their primitive instincts, but without any allegiance to herd or social tradition. The conscience or moral sense has never developed because there has been no home or other satisfactory guiding influence to produce the necessary training and discipline; indeed one has seen the exact opposite in operation, viz., what may be termed an "immoral sense," highly developed as a direct result of home and parental influence of an unfor-

tunate kind, leading to thieving, lying and sexual laxity. There must surely be hope for reformation of such individuals in a completely changed environment with sympathetic training if sufficient time is allowed for a radical readjustment to social life.

I must confess that I see no justification for the view that there is, in such cases, an inborn defect which prevents the development of the moral sense, and surely it is only in the cases of organic cerebral lesion that the term moral defective can rightly have any application. I realize that a valid criticism of this view regarding the undesirable influences which tend to produce the psychopath is that cases showing strong anti-social tendencies and absence of altruistic feelings may crop up in families where religious and moral principles have always been prominent. The answer, I think, is that these are examples of the effect of frustration and rebellion against authority which has produced strong contra-suggestion, resulting in opposing moral and social beliefs and behaviour. In high social and political circles there have been notable examples of this particular type of black sheep of either sex. Another group of cases from which arise many juvenile and older delinquents is that of the highest grade mental defectives who tend to be so readily suggestible and easily influenced by those whose ethical standards are low. Among Army cases referred for a psychiatric opinion I have found that the high grade defective is frequently tried beyond his powers in the course of modern training, and that this results either in minor delinquency or in vague neurotic symptoms. It is at any rate satisfactory that there is a growing recognition that the psychiatrist may be of assistance in such situations. If we are to make progress in the preventive side of psychological medicine, close co-operation must be maintained with social medicine and our colleagues in public health. We are living in an age of social changes; class and educational differences are being lost, and fresh problems of community life are arising almost daily. Overcrowding and the housing shortage are evident in both town and country, and the temporary prefabricated houses, with hardly a semblance of privacy, are far removed from anyone's idea of "An Englishman's Castle"! The housewife's worries are hardly less than during the war years—queues, rationing and shortages make her day-to-day tasks extremely difficult. Such conditions are the forerunners of feelings of frustration and dissatisfaction, which lead towards neurotic forms of illness. Service pensioners, with some form of psycho-neurotic disability, are finding the housing problem particularly trying and difficult of adjustment, and are thereby handicapped in their progress towards rehabilitation. Loneliness is found in the midst of overcrowding, and this applies to those of all ages. We must all take a share in shouldering social responsibilities. I believe that well organized community centres and social clubs have a great part to play in the prevention of early symptoms of mental disharmony and neuroses. Recreation and relaxation in cheerful and congenial surroundings conduce to positive health, and one of our main aims must be to produce a real desire for fitness and good health and a pride in its possession which will overcome that weakness which grasps at escape into illness. As psychiatrists, who claim to be concerned with behaviour disorders of all types, we have on the whole paid too little attention to the subject of child psychiatry. The

study of maladjustment and emotional instability in childhood should take a leading part in the long-term policy of preventive mental treatment. It must be confessed, however, that there are not at the moment a sufficient number of psychiatrists experienced in this branch to take charge of all the clinics which are required so urgently in many parts of the country. The ideal plan is not for narrow specialism in this field, but for an increasing number of psychiatrists experienced in other directions to take their share of work in the clinics for children and so gain the additional experience gradually. It may well be that in the National Health Service a considerable part of the work of child psychiatry may be undertaken by those who are expert in mental deficiency. Their specialized knowledge has been kept within the confines of institutions and colonies far too long. Under the forthcoming regional planning it is to be hoped that every experienced psychiatrist in the Service will take his or her share of extra-mural duties. Psychiatry has much to gain from regional organization; of that I am convinced. It is quite impossible for medical services to function efficiently in watertight compartments as has been attempted unfortunately in past years. Co-ordination and co-operation to be successful require energy and good will on the part of all concerned. The future of psychiatry, as outlined in our joint memorandum, is in the hands of our younger members and of those who will be taught and guided by them; I look to them with confidence to see that our mental hospitals maintain a steady rate of progress and modernization. For obvious reasons during the war years some retardation was inevitable. Active and vigorous individual treatment for all types of case must be the rule. The idea that a mental hospital is in any way a home for incurables should once and for all be relegated to the past. The best possible type of young practitioner must be attracted to the work. This will be brought about only if the highest clinical standards are maintained. A term of apprenticeship in general practice is, in my opinion, highly desirable before taking up the specialty; in no other way can social conditions be so well studied and the early signs and symptoms of mental illness be so well observed. Indeed much minor psychotherapy is carried out and must continue to be carried out by those practising general medicine; it is well that it should be so, but it emphasizes the importance of the medical student receiving at the hands of his (or her) specialist teachers the broad outlines of modern psychiatry. Specialists in psychiatry are, as yet, too few in number to fill adequately all the posts which will be required in the new service. In the mental hospitals alone a very considerable increase in the numbers of the medical staff—part-time and whole-time—is necessary if the standard of treatment of *all* the patients is to be raised, as it should be, to that obtainable in the best general hospitals. We now have the varied means of treatment at our disposal—psycho-therapeutic, physical, surgical, pharmaceutical, occupational and recreational—and I want to see every ward in a mental hospital an active treatment ward. I hope that it may not be long before those whose only failing is due to the effects of old age are treated and housed in a more suitable place than a mental hospital ward. In the past, for a number of reasons, we have been far too ready to label a case “chronic”; and an aggregation of such cases, which are to a great extent the creation of

their surroundings, has made up a "chronic ward." That is the situation which we must determine to abolish. Given an adequate staff, medical and nursing, of sufficient experience, I see no reason why every individual patient should not be on the *active* treatment list. An Utopian prospect perhaps, but none the worse for that. The nursing question is a very serious one. I feel sure, however, that the more bedside nursing we have to offer, the more student nurses we shall attract. The large wards overcrowded with patients receiving little more than custodial care have acted as a very decided deterrent to the enthusiasm of a young, budding nurse; the facts must be faced, and we can no longer afford for the service to be unpopular. But I have the greatest faith in the present generation of younger (or at any rate less old) psychiatrists. I believe that, speaking generally, their interest in the work is greater than that of the preceding generation largely because of the advances in knowledge and possibilities in treatment and that, as the country's circumstances permit, new mental hospitals will be planned and built with smaller wards suited for continuous and intensive treatment and for a total patient population of not more than a thousand.

The simplification and modernization of the law relating to mental treatment—and especially as to the admission of patients into hospital—is now generally recognized as being over-due, but must still await its turn in the legislative queue. I look forward, however, eagerly to the time when very considerable extension of the use of temporary treatment without judicial intervention is permitted by amendment of the Act.

The responsibilities of our Association and of its individual members will be very considerable as the skeleton plan of the comprehensive Mental Health Service is organized, system by system, until it comes into being as a vivid entity. I believe that the prospects are bright, and that the opportunity of working in close harmony with general medicine is before us.

The pessimists in this country have always been wrong. I am an optimist. As regards psychiatry, "the present interests me more than the past and the future more than the present."

THE IDENTITY OF ALZHEIMER'S DISEASE AND SENILE DEMENTIA AND THEIR RELATIONSHIP TO SENILITY.

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INTRODUCTION.

Since Alzheimer (1907) described the disease which bears his name there has been considerable controversy about its relationship to senile dementia and senility. In the course of years there has been little advance towards a solution of the problem.

A review of the literature on Alzheimer's disease and senile dementia seemed to show that there were no clinical, pathological or aetiological grounds for distinguishing between them. There was plainly a similarity to normal senility, in that the same histological features occurred in the brain in this condition, provided that the individual lived long enough.

It was decided, therefore, to examine the brains from consecutive autopsies at a mental hospital in order to discover how frequently the changes characteristic of Alzheimer's disease and senile dementia occurred. One hundred and fifty brains were examined. These histological features were frequently found, and were seen to vary in quantity, quality and distribution. Often they could not be related to the clinical findings, and unless they were profuse, they did not seem to give rise to any symptoms. The parenchymal changes in the brain were found in different stages of development as it were, depending upon whether the patient succumbed to intercurrent disease. Moreover, cases of Alzheimer's disease and senile dementia overlapped, and in some cases it was not possible to differentiate between the two.

It is recognized that these dementias are closely related to the process of ageing, and these findings seemed to suggest that the central nervous system was ageing in advance of other parts of the body in Alzheimer's disease and senile dementia. Only in normal senility had the other systems of the body aged at the same rate as the central nervous system.

It was with these ideas in mind that this paper was written. A review of the literature from a clinical, pathological and aetiological standpoint is presented first. This is followed by a section indicating the relationship of Alzheimer's disease and senile dementia to normal senility. In this section some suggestions are put forward which seem to follow from the review of the literature. The section also forms an introduction to the case material which follows, and to the discussion.

CLINICAL.

Grunthal (1926) has described three stages in the clinical course of Alzheimer's disease :

(1) A gradual memory loss, disturbance of perception, carelessness in work and appearance, disorientation for place, weakness or epileptiform attacks, some loss of words and slurred speech.

(2) Complete disorientation for time, place and person, dulling of comprehension, inability to read or do sums.

(3) Extreme irritability with paraphasia, uncleanliness and stereotyped movements.

Unfortunately, however, many cases in the literature do not conform to these stages, and Rothschild (1934), and Rothschild and Kasanin (1936), remark that individual clinical pictures differ considerably.

The latter authors report cases (Cases 2, 3 and 4) of Alzheimer's disease with some somatic features that are associated with senile conditions. They remark that such cases " suggest a close relationship to senility." They go on to say that in such cases " the chief difference between Alzheimer's disease and senile dementia is quantitative, the changes being severer in the former disease than in the latter." In speaking of Alzheimer's disease, they say " the regression is in some respects more profound than that usually noted in senile dementia. The more vigorous reaction to the disease may be based on the fact that younger persons are involved." These statements do not support their conclusion that Alzheimer's disease " may be regarded as a fairly well defined clinical entity," and only suggest that " the disease " is the same in both Alzheimer's disease and senile dementia.

A frequent finding in Alzheimer's disease and senile dementia is overactivity. It is specifically mentioned by Fuller (1912) in his review of the published cases of Alzheimer's disease, and McMenemey (1940) and Stengel (1943) and many others remark upon it. Hannah (1936) says that Alzheimer's disease is characterized by " energy misdirected," especially in the early stages, and senile dementia by exhaustion of the whole organism from the start. He believed that the two conditions could be distinguished clinically, but admitted that there was " overlapping," and that there were many similarities. It is difficult to know what is meant by " energy misdirected," and, as has been mentioned already, cases of senile dementia often show a marked motor unrest, and are far from exhausted at the beginning of the illness.

In contrast to this, Hemphill and Stengel (1941) have published a case of Alzheimer's disease, in which no motor unrest was noted apparently, and the clinical picture was one of depression. English (1942) also considers that depression is an outstanding feature of Alzheimer's disease, but in discussing the differential diagnosis between this psychosis and senile dementia, he says that the former are " usually more overactive." He fails to note any consistent finding to distinguish the two.

McMenemey (1941) suggests that there are " at least," two clinical varieties of Alzheimer's disease, and believes that atypical clinical cases are common. He remarks that although many authors consider there are differences between

Alzheimer's disease and senile dementia, we must be prepared to find borderline cases between the two, and quotes Grunthal (1930) as saying that the only difference may be a tendency in Alzheimer's disease to more focal symptoms.

The close relationship between these two conditions is emphasized by Jervis and Soltz (1936), who say that it is widely accepted that Alzheimer's disease is an early atypical form of senile dementia. Also by Marchand (1940), who regards Alzheimer's disease, Pick's disease and "*la démence pure sans athérome*" as being variants of the same condition, and remarks that the differential diagnosis between these three during life is frequently impossible. Also by Boyd (1936), who suggests that it is not possible to differentiate Alzheimer's disease from other diffuse diseases of the cortex solely on the psychological picture. Here, too, Rothschild's (1934) comment on his own cases may be aptly quoted: the symptom-complex of Case 3 resembled Pick's disease, and that of Case 5 more nearly approached senile dementia.

Bay and Weinberg (1942) refer again to Grunthal's three stages, and say that they are seldom seen in a pure form. They point out that if an attempt is made to define Alzheimer's disease as a clinical entity by perusing the literature, a variety of impressions will be gained, depending upon which authors are consulted.

In fact, there are wide clinical variations in both these conditions, and it is suggested here that this is due to differences in (a) the personalities of individual patients, (b) the site and severity of the pathological lesions, (c) factors in the environment. Critchley (1942) has described the following clinical subtypes of senile dementia: a confusional, a maniacal, a melancholic and a paranoid type. The same might be done for Alzheimer's disease.

It seems that these two conditions are not to be distinguished from one another clinically except by the arbitrary limits of age. But even about this there is some controversy.

At first it was thought that Alzheimer's disease occurred in the presenium only. Then Barrett (1913) described a case aged 33 years, and considered that the presenium could not be extended to include this case, so he says, "Alzheimer's disease is not confined to presenile years." Other cases were reported in the fourth decade, and finally Malamud and Lowenberg (1929) described a case in adolescence.

In the meantime, senile dementia had been strictly confined in the senium. However, this period proved to have rather vague boundaries. The earliest figure is that of Hannah (1936), who proposed the age of 55 as being the upper limit of the presenium. But 65, or even 70, were suggested by other workers. Finally, McMenemey (1940) considered that the age limit in each case of Alzheimer's disease "must be judged on its own merits in view of the known differences in ageing in families and individuals." It appears impossible, therefore, to distinguish between these two conditions clinically.

PATHOLOGY.

The characteristic pathological changes of Alzheimer's disease are the widespread atrophy of the cortical neurones of the brain, with the presence of neurofibrillary alterations, "spirals," "loops," or "tangles," and miliary plaques.

The neurofibrillary tangles are the remnants of ganglion cells (Alzheimer, 1911; Critchley, 1929; Hassin, 1933).

The origin of the plaques is still the subject of controversy, and will be referred to later. Localized areas of cortical atrophy may occur, but no particular part of the brain seems to be affected primarily. Generally speaking the blood vessels show minimal changes, and usually are not regarded as playing an important part in this condition. The work of Pickworth (1938), however, on the capillary bed in the brain suggests that alterations in the blood supply to different parts of the brain may prove a major factor in determining clinical features, and may be of aetiological influence also. This question is dealt with, however, at greater length under the section on aetiology.

The above lesions are not necessarily constant. Thus Alzheimer (1911), Fuller and Klopp (1912), Lowenberg and Rothschild (1931) and others have described cases in which no neurofibrillary alterations occurred, and Rothschild (1934) has remarked, "A particular type of lesion may be completely lacking in Alzheimer's disease without invalidating the diagnosis."

In spite of this statement, however, it is doubtful whether this psychosis can occur without the presence of plaques. It seems that only one case has been recorded in which the neurofibrillary changes occurred alone. Rothschild and Kasanin (1936), who published the case, regard it as an instance of toxic psychosis, and not Alzheimer's disease, a diagnosis which will be commented upon later.

The plaques, then, are regarded here as being an essential feature of Alzheimer's disease.

Unfortunately, in many cases, the diagnosis of Alzheimer's disease has not been based upon the pathological lesions only, and several workers have sought confirmatory evidence in the clinical features of this psychosis before making a diagnosis. Where they believe they have found atypical clinical features they reject the diagnosis of Alzheimer's disease, usually without providing a substitute. Thus Jervis and Soltz (1936), when reviewing the so-called "juvenile" cases of Alzheimer's disease reported by Perusini (1910), Urechia and Danetz (1924), Lowenberg and Waggoner (1934), Barrett (1913), Malamud and Lowenberg (1929), and Schottky (1932), all of which show typical pathological changes, disagree with this diagnosis in all except three cases, on the grounds that the pathological lesions are "insufficient," or that they show atypical clinical features. Also Rothschild and Kasanin (1936) describe a case with all the pathological lesions of Alzheimer's disease, which they regard as a case of toxic psychosis, because of its clinical features. This case also will be commented upon later. It is sufficient to remark here that the review of the signs and symptoms of Alzheimer's disease above, shows how difficult it is to say what is typical and what is atypical clinically.

In senile dementia the pathological lesions may be precisely the same as in Alzheimer's disease, but again not necessarily so. Thus neurofibrillary changes were found only in 85 per cent. of cases by Grunthal (1930), and in 92 per cent. by Rizzo (1924). And Rothschild (1937) and Lowenberg (1937) consider that senile dementia can occur in the absence of plaques, but Uye-matsu (1923) and Grunthal (1936) do not agree with this. Again, it is con-

sidered here that if senile dementia is to be established as an entity at all, it must have some definite pathology, and the miliary plaque has proved to be the most constant parenchymal lesion. It should be emphasized, therefore, that in both these conditions the miliary plaques are the basic histological finding.

With advancing years vascular degeneration and sclerosis become increasingly evident. It cannot be doubted that such factors will prove of major importance in senile dementia, and will presumably modify the clinical features. It has been suggested already that similar conditions may occur in Alzheimer's disease, and it may be that these vascular changes are responsible for the "atypical" clinical features which have caused so much confusion in the past. There is no evidence that miliary plaques themselves produce dementia. Kinnier Wilson (1940), in speaking of the miliary plaques, says, "Any attempt to link their occurrence with this or that clinical symptom is futile." The mental deterioration is caused by the destruction of the nerve cells, which may be a primary event due to inherited qualities in the cells, or may be secondary to vascular changes or other factors unknown at present.

Miliary plaques have been found in conditions other than senile dementia and Alzheimer's disease. Gellerstedt (1933) found plaques in 84 per cent. of a series of normal elderly persons, and Marinesco (1911) and Critchley (1931) have described them also in such people. Gillespie (1933) and McMenemey (1941) have pointed out that both plaques and neurofibrillary changes have been observed in many different diseases, mostly neurological. But McMenemey remarks that they are "not abundant" in conditions other than Alzheimer's disease and senile dementia. Probably in these cases the patient has died before the parenchymal lesions have had time to become profuse.

Attempts have been made to distinguish between Alzheimer's disease and senile dementia by a quantitative examination of the parenchymal lesions. Critchley (1930) regards the neurofibrillary changes as being more frequent in Alzheimer's disease and the plaques more frequent in senile dementia—a conclusion hardly consistent with the cases of Alzheimer's disease mentioned above in which no neurofibrillary change was noted. Simchovicz (1910, 1924) described an index of miliary plaques based upon a frontal and occipital count. He believed that in senile dementia this index was greater than one, and in Alzheimer's disease less than one. His methods have been criticized aptly by McMenemey (1941), who points out that there must be many uncontrollable factors influencing the count in each case. Nevertheless, Mayer-Gross (1938) thought that the lesions in Alzheimer's disease were more frequent in the posterior parts of the brain, and in senile dementia in the frontal half. This conclusion has not been supported by other workers, notably Jervis (1937) and McMenemey (1941).

Finally, the miliary plaques have been scrutinized in the hope of differentiating between these two conditions. Hannah (1936) found that the plaques in Alzheimer's disease were larger than in senile dementia, and that they did not have any microglial reaction around them. Similar investigations were carried out by Jervis (1937), who concluded that the qualitative pathological findings were the same essentially in Alzheimer's disease and senile dementia. The

position has been clarified by McMenemey (1941), where he quotes the opinion of Hortega that the activities of the microglia are the same in both Alzheimer's disease and senile dementia, the only difference being one of degree. Jervis and Soltz (1936) examined this problem also, and say, "We feel, as does Grunthal, that from the pathological viewpoint alone Alzheimer's disease cannot be differentiated from senile dementia."

AETIOLOGY.

1. *Heredity.*

Familial examples of Alzheimer's disease described by Schottky (1932), Von Braunmühl (1932), Lowenberg and Waggoner (1934), and McMenemey, Worster-Drought, Flynd and Williams (1939) suggest that an hereditary factor may be present.

In addition to these, James (1933) has mentioned a case of Alzheimer's disease with the same condition occurring in one or more siblings, the father probably suffering from Pick's disease. Lowenberg (1937) refers to an example of senile dementia in a father, followed by Alzheimer's disease in his son, and Lowenberg and Waggoner (1934) say that heredity may be of aetiological importance. English (1942) has described a case in which the mother and maternal siblings probably suffered from Alzheimer's disease. Henderson (1933) also considers that hereditary factors are present in Alzheimer's disease. Nevertheless, no further evidence for an hereditary factor has been forthcoming, and more recent writers, notably Ferraro and Jervis (1941), Hemphill and Stengel (1941), and Stengel (1943), expressly mention that no hereditary factor could be traced in their material. Also English (1942), in spite of his case quoted above, considers that heredity is not a major factor in this disease. These familial examples, moreover, are rare when compared with the large number of cases of Alzheimer's disease that have been reported. This does not exclude the possibility of genetic transmission, however, and in this connection it is interesting to note that the cases of Lowenberg and Waggoner (1934) and McMenemey *et al.* (1940) followed upon a marriage of first cousins.

As regards senile dementia, Grunthal (1936) considers there is no evidence for an hereditary factor—a statement with which Rothchild (1937) agrees. The case of Lowenberg's (1937) quoted above indicates once again the close relationship between Alzheimer's disease and senile dementia, and as there is evidence that heredity may be a factor in the former condition, it may be that it is a factor in the latter also.

The question of hereditary transmission is referred to again in the discussion on the case material.

2. *Somatic Factors.*

There has been no evidence that vascular changes are responsible for the parenchymal lesions in Alzheimer's disease or in senile dementia. In the former condition the cortical vessels show sclerotic changes frequently, but these do not seem to be more marked than in the brains of normal people of the same age. In senile dementia the arteries are even more affected, and

it is probable that restriction of blood supply is responsible for the death of many nerve cells. But how much this destruction is caused by arteriosclerosis and how much by other factors it is impossible to say. It may be noted that the miliary plaques do not occur usually in relation to the capillaries, and there is no evidence that vascular changes play a part in their formation.

Pickworth (1938) identifies mental and emotional states with a cortical capillary mosaic pattern, which is itself the controller of the synaptic junctions of the neurones of the central nervous system.

The blood flow in the various capillary patterns is controlled by impulses from the higher reflex arcs of the central nervous system and by sympathetic stimuli, and sustained in these channels by metabolites and hormones. The capillary mosaic is susceptible also to alteration by toxins, but once fixed, a particular pattern tends to persist. Pickworth says: "Mental disorder can therefore be identified with a mixing up of normal and abnormal capillary mosaic patterns. Fragments of some pattern may be assumed to persist coincidentally with fragments of other capillary patterns, in which case a stimulus reaching the brain results in a behaviour corresponding with the predominant type of pattern, coloured by other fragmentary patterns also existing at the same time."

These conceptions are interesting from the point of view of the psychoses discussed here. They might apply in particular to those cases in which worry, emotional shocks, anxiety or toxic influences have been found to be precipitating factors. The case of Alzheimer's disease described by Lowenberg and Rothschild (1931), which showed a remission for 8 years, indicates that nerve-cell destruction cannot be gross in the early stages; that the dementia was a clinical finding, and was not based upon major pathological change.

In such cases it is possible that variations in the vascularity of certain areas of the brain are responsible for the onset of the mental symptoms, but at present it is difficult to see how such variations can produce the widespread parenchymal lesions which are characteristic of these conditions.

3. *Toxic Factors.*

Rothschild and Kasanin (1936) describe five cases of Alzheimer's disease in which no toxic, infectious or traumatic factor occurred in relation to the onset of the disease. They follow these with two cases showing evidence of toxicity at onset, and giving a clinical picture which they consider typical of a toxic psychosis. They do not regard these latter cases as suffering from Alzheimer's disease, in spite of the typical histopathological findings in one case.

It has been shown above, however, that there is no clear cut clinical picture of Alzheimer's disease. So that it can only lead to confusion if a condition having the typical pathological lesions is called toxic psychosis because the clinical findings are atypical. Therefore it is suggested here that all cases showing the typical pathological lesions should be regarded as examples of Alzheimer's disease, whether the condition was precipitated by a toxic process or not.

Rothschild and Kasanin object that in order to accept this view, a "latent

form" of Alzheimer's disease must be presumed, which has not been reported in the literature. What they mean by a "latent form" is not quite clear, but presumably they are referring to the possibility of the parenchymal changes being present without disclosing any symptoms. This question has been referred to already in the section on pathology, where it was pointed out that the miliary plaques may be found in many conditions other than Alzheimer's disease and senile dementia. As will be shown below also, they occur frequently in psychotic patients over the age of 50 years.

Although, then, McMenemey (1940) has said that the importance of a toxic factor in Alzheimer's disease "cannot be minimized in certain cases," there is no evidence that such factors have more aetiological significance in the psychoses discussed here than in any other psychosis.

4. *The Choroid Plexus.*

The juvenile case of Malamud and Lowenberg (1929), in which there were marked degenerative changes in the blood vessels of the choroid plexus, drew attention to the possibility of such alterations being of aetiological significance in Alzheimer's disease. But, although degenerative changes are seen in this condition, these appear to be no more than would be normally found with advancing years, and the composition of the C.S.F. remains stable. Cowdry (1942), in fact, has remarked upon the stability of the blood C.S.F. barrier with old age, and finds changes in the C.S.F. almost negligible, while Rothschild (1937) found that, in senile psychoses, the choroid plexus lesions and the alterations in the permeability of the blood-C.S.F. barrier had no causal relationship to the parenchymal changes.

5. *Psychosomatic Factors.*

The suggestion has been put forward by Rothschild (1937) that a review of the whole personality of the individual might provide a key to the aetiology of senile dementia. White (1929) divided psychiatric patients into four broad groups, the paranoid, cycloid, schizoid and epileptoids. The first two groups he described as "compensatory," and the second two as "non-compensatory." His hypothesis was that from a psychogenic and somatic point of view, the compensatory types reacted to a stimulus, whereas the non-compensatory persons did not, or did so ineffectively. For instance, in the schizoid group the tendency was to become worse psychologically and to succumb to somatic diseases, such as tuberculosis. On the other hand, the paranoid group reacted vigorously by producing a delusional system, and such somatic diseases as malignant tumours and circulatory disasters. These he found occurred frequently in this group, and he considered them to be compensatory in character.

Arguing upon these lines, Rothschild suggested that the senile dement is a non-compensatory type. In his own series of cases of senile dementia he found that, although there were exceptions, there was evidence of correlation of reaction at the psychic and somatic levels, and that, on the whole, powers of compensation proved to be weak. So that, if White's hypothesis is valid, a

review of the past history of the senile dement should disclose a tendency to schizoid or epileptoid traits.

If this is true of senile dementia, it should apply also to Alzheimer's disease. For here the patient is younger, and presumably more able to muster such compensatory faculties as are available. So that the fact that these patients succumb argues an even feebler power of reaction than in senile dementia. Certainly Rothschild and Kasanin (1936) and McMenemey (1941) remark upon the attempts at "rejuvenescence" in Alzheimer's disease, citing the motor unrest and some emotional changes as evidence of compensation, but the point is that these efforts are ineffective. It would be expected, therefore, that non-compensatory personality traits would abound in these patients. But, although these tendencies do not seem to have been specifically looked for in the cases reported in the literature, on reading the case-histories the impression is formed that compensatory and non-compensatory traits are equally likely to occur. Thus, of the seven cases reported by English (1942), all except two were "more or less extraverted, interested in other people, fulfilling their parts in personal and community social activities." And later he remarks, "introversion is conspicuous by its absence in this series." Also Case 4 had a previous attack of manic-depressive psychosis, a "compensatory" type of reaction.

On the other hand, Case 7 in this series had many features suggestive of schizophrenia, and was diagnosed as dementia praecox at one time. But this was a feature occurring after the onset of the illness, and the history showed no unusual personality traits.

The Rothschild and Kasanin (1936) Case 4, which was also schizoid in type clinically, had continued ill health in childhood and was presumably of an introverted type.

Again, the case of Jervis and Soltz (1936), although an early case of Alzheimer's disease, dying at the age of 42 years, showed no abnormal personality traits before the onset of the illness. He was said to be sociable, cheerful and even tempered, but appears to have been below the average level of intelligence.

Boyd's (1936) case was described as a "syntonic well-adjusted individual" previous to the onset of illness at 49 years.

Although lack of material makes any conclusion on this aspect of the aetiology impossible, it will be noted that miliary plaques tended to occur more frequently in paranoids and cycloids in the case material in this paper than in the schizoids and epileptoids—a finding exactly the opposite of what would have been expected on White's theory.

6. Ageing.

Many workers have remarked upon the tendency for miliary plaques to occur in the brain with advancing years, and have agreed that these appear inevitably provided that the subject lives long enough. Thus these plaques have become identified as marks of senility (Critchley, 1929, 1942), and the passage of time is regarded as an aetiological factor in their production. Roths-

child (1937) has said, "With advancing age the brain shows an increasing tendency to the formation of plaques, but there may be other factors concerned in their origin, and these factors, though still unknown, are largely independent of age and may well differ from case to case." Here, then, is a definite suggestion that "advancing age" may be responsible for plaque formation, and that it is, at any rate, a factor in their production. Even if it is assumed that definite changes do occur in the brain as the result of ageing, there is still no evidence at present that the above suggestion is true, apart from the reports of Gellerstedt (1933), Critchley (1942) and others that miliary plaques occur invariably after the age of 90 years.

In fact, our knowledge of the changes in the central nervous system due to ageing, which has been reviewed by Cowdry (1942), does not show any evidence that plaques are being formed, with the possible exception of the alterations due to the ageing of colloids. Herbert Spencer explained the colloidal nature of the cell protoplasm, and spoke of the ageing of this substance as "an approach toward molecular equilibrium." This property of condensation with age was named "hysteresis" by Ruczicka, who described a progressive decrease of the electrical charges of the colloid particles, and dehydration. The result is a gradual loss of energy, and reduction of the total surface of the cell, so that metabolism is eventually brought to a standstill.

This conception was elaborated by Von Braunmühl (1932, 1934), who suggested that the miliary plaques are a secondary manifestation of these colloidal changes. But in his view the nervous system must be impaired first by exogenous and endogenous factors before the lesions can appear.

The fact that the pathological picture of senile dementia occurs also in association with normal senility was emphasized first by Tilney (1928), who said, "Thus it appears, from the clinical as well as from the anatomical standpoint, that senile dementia does not differ essentially from the ultimate state of normal old age except in its less (*sic*) rapid development."

Von Braunmühl tries to explain this by postulating these primary factors which are unknown. He says that the fundamental tissue alterations are more advanced in senile dementia, although the senile lesions, the secondary phenomena, may be no more prominent or even less so than in normal senility. This hypothesis has been aptly criticized by Rothschild (1937), who points out that since the primary lesions are undemonstrable, it is impossible to say whether they are more frequent in senile dementia or normal old age. Von Braunmühl therefore does not explain the presence of miliary plaques, but only suggests that some unknown factors in association with colloidal ageing may be responsible for them.

Many other workers have sought to explain the presence of plaques on a histopathological or histochemical basis. Their theories have been summarized by Hiroisi and Lee (1936), who describe twelve different hypotheses which have been advanced to account for them. As these authors point out, nearly all the known elements of the central nervous system have been held responsible for the formation of these plaques at one time or another. They themselves consider that they are the result of a mucoid degeneration of the oligodendroglia. It is safe to say that more work must be done upon this subject

before the origin of the miliary plaques is known exactly. In the meantime, it seems premature to regard them as marks of age, especially when the process of ageing itself is so little understood.

The passage of time, however, does account for the death of the nerve cells, in that death is regarded as a normal accompaniment of old age. But in senile cases it is impossible to say how far the nerve-cell loss is due to the fact that the cells have reached "molecular equilibrium," and how far their death is the result of factors in the environment. In the "presenile" or younger cases, however, death of the nerve cells from old age must be considered abnormal. Yet it is this that seems to occur, for often there are no extrinsic factors demonstrable which could account for their death, and other parts of the body appear to be still comparatively young. If, then, they do die because they have reached their allotted life-span, the causative factor is an intrinsic one in the cell itself. It is suggested here that this is what occurs. If this is so, then the whole question of the aetiology of Alzheimer's disease and senile dementia is probably a genetic one. This matter is referred to again in the next section, and in the commentary on the case material.

Relationship with Normal Senility.

It appears from the above review of the literature that there can be no justifiable grounds for speaking of Alzheimer's disease and senile dementia as separate entities. For there are no significant histological differences between them; clinically there are no constant signs or symptoms on which they could be differentiated; and in both the aetiology is unknown. It seems unnecessary, therefore, to separate them solely on the grounds of age.

The condition known as "normal old age" has yet to be accounted for. It is well known that the pathological criteria of Alzheimer's disease are present also in extreme old age. But whereas in Alzheimer's disease and senile dementia the process is a relatively rapid one, and the soma and psyche react to the process of destruction in the central nervous system, in senility there is no such reaction, or it is minimal. One by one the nerve cells die, and one by one the plaques multiply in the brain while the other organs correspondingly decline. It seems as if the process of decay is integrated throughout the organism, no part is in advance of another, and hand-in-hand the various "systems" march along the road to oblivion. If trauma or infection do not intervene, the psyche slowly deteriorates until regression is complete.

The condition seems, therefore, to be nothing more than a death from inertia. The cells have lived their allotted span, and their electrical charges have reached an equilibrium.

The same process probably occurs in Alzheimer's disease and senile dementia. Research on the aetiology of these conditions has failed to produce any constant factor, as has been noted already. Possibly this is because it has been sought only in the environment and not in the cell itself. In other words, this factor is a genetic one, and it is interesting to note that Von Braunmühl (1931) has suggested that Alzheimer's disease is an heredo-degeneration.

The problem, therefore, becomes one of genetics. It is not only the variations in the viability of the nerve cells in different individuals and families which have to be accounted for, but also the cause of these variations in the nerve cells relative to the other cells of the body.

These variations will be determined on the one hand by the genetic constitution of the individual, and on the other by the nature of the nerve cells themselves. For whereas many cells of the body can be replaced, and a particular organ kept functioning by such replacement, in the central nervous system, no such process can occur, and each nerve cell dead is an irreplaceable loss to the organism. Fortunately, the brain is endowed with an excess of these cells over its immediate wants. The organ is, therefore, able to retain its efficiency in spite of the loss of many members of the cell community. But there must come a time when the functions of the brain are impaired by these losses, and it may be that the increased work which the survivors are called upon to do may in turn accelerate their death, so that a vicious circle is set up.

If this hypothesis is correct, then Alzheimer's disease, senile dementia and "normal old age" are examples of the same condition occurring at different ages. In normal senility all the cells of the body have been genetically endowed with long life, and presumably the assaults from without have been minimal, or have been exceptionally well resisted. Streeter (1931), when discussing mortality tables, says that they become intelligible "if one accepts the point of view that there is an egg-determined life span and an egg-determined vitality of individual organs." It seems that, in persons who die of "normal old age," the "egg" must have been a good one.

On this hypothesis it might be expected that if the brains from a random group of persons coming to autopsy were examined, the histological features of Alzheimer's disease would be found in different stages of development. The findings would depend largely upon the age of the patient, and in some the lesions would not be sufficiently marked to produce symptoms, or the symptoms might be masked by those of the illness which had caused death. In a few cases, however, these changes in the brain would be fully developed, and then they might be the cause of the death of the whole organism.

The brains examined in the case material below were not strictly a random group. They were all inmates of a mental hospital, and all except seven were certified under the Lunacy Act. Thus no cases of normal senility were available. There is also the possibility that psychotic persons are peculiarly liable to hereditary taints, which express themselves in the central nervous system. So that a higher incidence of these histological changes might be expected in these persons than in those who were mentally normal.

CASE MATERIAL.

The brains from 150 consecutive autopsies at a mental hospital were examined. The deaths occurred between 4.xi.38 and 30.xi.39, and the autopsies formed 94.6 per cent. of the total deaths occurring in the hospital in this period. All the cases were certified under the Lunacy Act, except seven, who were voluntary patients.

Method.

As a routine measure, sections were taken from the frontal and occipital poles and from the cornu ammonis. In brains showing cortical atrophy elsewhere, further sections were taken from such areas. All sections were stained by Von Braunmühl's method of silver nitrate impregnation, as this showed both miliary plaques and neurofibrils particularly well, and was relatively rapid.

Cases in which small numbers of plaques with irregular distribution were observed were further investigated, sections being taken from the parietal, motor and sensory and temporal regions. Where, however, small numbers of plaques were evenly distributed throughout the areas examined, no further investigation was attempted, as this was taken to be a true indication of the degree of parenchymal change in that particular brain.

In addition, ten of the cases were more fully investigated. Methods used in these cases were those of Von Braunmühl, Hortega's silver carbonate and nitrate techniques, Cajal, Loyez, Bielschowsky, Weil, Weigert elastin, Mallory's aniline blue, Mallory's phosphotungstic acid haematoxylin, Weigert elastin and Van Gieson, haematoxylin and eosin, and the Nissl stain. In the majority of these ten cases the endocrine glands, the liver, spleen, kidneys, heart and aorta were also examined microscopically.

TABLE I.—*Incidence of Miliary Plaques and Neurofibrillary Changes in the Brains from 150 Consecutive Autopsies.*

	Age-groups.*						Percentage of total cases examined.		Total.
	65-96.		50-64.		17-49.		M.	F.	
	M.	F.	M.	F.	M.	F.			
Large numbers of plaques with neurofibril changes	2	13	0	3	0	0	1.3%	10.6%	18
Small numbers of plaques with neurofibril changes	2	8	0	2	0	0	1.3%	6.6%	12
Large numbers of plaques without neurofibril changes	1	4	0	0	0	0	0.6%	3.3%	5
Small numbers of plaques without neurofibril changes	2	5	2	7	0	0	2.6%	8%	16
Neurofibril changes only	1	1	1	1	0	0	1.3%	1.3%	4
No plaques or neurofibril changes	5	8	15	28	16	23	24%	39.3%	95
Total cases examined	13	39	18	41	16	23	31.5%	68.5%	150

* "Age-groups" refers to age at death.

TABLE II.—*Plaque Incidence in Various Age-Groups.*

Age-group.	Total examined.		Without plaques.		With plaques.	
	M.	F.	M.	F.	M.	F.
65-96	13	39	6	9	7 (54%)	30 (77%)
50-64	18	41	16	29	2 (11%)	12 (29%)
17-49	16	23	16	23	0	0

Relationship Between Parenchymal Changes and Sex.

Reference to Table I shows that females : males examined were as 2 : 1 approximately. As is shown in Table II, however, four times as many females showed miliary plaques in the senile age-group, and six times as many in the presenile age-group. Moreover, amongst the males examined in the senile age-group, only 7 (54 per cent.) show parenchymal changes as against 30 (77 per cent.) of the females. Also, reference to Table I shows that of these 7 (54 per cent.) males, only 2 (28 per cent.) had maximal changes quantitatively, whereas in the like group of females, 13 (43 per cent.) had large numbers of plaques and neurofibrillary alterations.

In the presenile age-groups the preponderance of miliary plaques in the females is even more striking. For the 2 (11 per cent.) males in this group who showed any parenchymal changes at all did so in minimal amounts, but of the 12 (29 per cent.) females, 3 (25 per cent.) had a maximal amount of parenchymal change. In this series of cases, therefore, the incidence of parenchymal changes is considerably greater amongst the females than the males.

Comment.

The findings suggest that these histological changes occur in the brain at an earlier age in females than in males. This observation is borne out by the preponderance of females over males in the reported cases of Alzheimer's disease. Rothschild (1934) gives the incidence of females : males as 3 : 2, Mayer-Gross (1944) says, "A completely unexplained feature of Alzheimer's disease is the prevalence of females."

It has been suggested elsewhere in this paper that the primary aetiological factor in Alzheimer's disease is a genetic one. If this is so, then the prevalence of these findings in females can be explained along the lines indicated by Penrose (1942). He points out that harmful dominant mutations which produce their effect before or in the reproductive period tend to be eliminated by the effect of natural selection, because in these individuals fertility is reduced. Recessive mutations, on the other hand, and dominant ones which produce their effect after the reproductive period are less susceptible, because fertility is not affected.

Slater (1944) has pointed out that some of the familial cases of Alzheimer's disease which have been reported suggest a fundamentally dominant mode of inheritance. At the same time there seems no doubt that the effect is produced normally after the reproductive period (Table I). If it is assumed, then, that the mode of inheritance is dominant and that the effect is produced after the reproductive period, the degree of postponement will be greater in the male than the female as the former has a potentially longer reproductive life. It would be expected, therefore, that these histological changes in the brain would be found at an earlier age in females than in males.

*Relationship between Presence of Miliary Plaques and Type of Psychosis.**1. Affective Psychosis.*

Table III shows that of the 76 cases of affective psychosis, nearly half (32 cases) showed miliary plaques, or neurofibrillary changes, or both, in the brain

at autopsy. But of these 32 cases, 13 were under 65 years at death, and so may be considered to have developed parenchymal changes in the brain at a comparatively early age.

TABLE III.—*Incidence of Miliary Plaques and Neurofibril Change in Different Types of Psychosis.*

	Total number of cases.	Cases showing plaques or neurofibril changes, or both.		Cases showing large numbers of miliary plaques with or without neurofibril changes.
		Number.	Age-group.*	
Affective psychosis	76	32	50-89	7
Schizophrenia	19	2	52 and 60	0
Paranoid psychosis	7	4	63-77	0
Idiopathic epilepsy	9	2	71-84	2
General paralysis of the insane	14	0	—	0
Imbecility	2	0	—	0
Organic dementia	23	15	58-96	14

* "Age-group" refers to the age at death.

(a) *Cases Under 65 Years at Death with Miliary Plaques Present.*

Some details of these cases are set out in Table IV. It will be seen that in the majority the lesions are present in small numbers only and are locally distributed. Plaque incidence is greatest in the hinder parts of the brain, in conformity with the opinion of Mayer-Gross, who considered this a feature of

TABLE IV.—*Thirteen Cases Diagnosed as Affective Psychosis Showing Parenchymal Changes in the Brain at Death under 65 Years.*

Case number.	Age at death.	Sex.	Distribution of parenchymal changes in brain.
19	53	F.	Miliary plaques in occipital, frontal and temporal cortex and insula.
49	62	F.	Plaques in small numbers present everywhere in cortex and neurofibrillary changes in hippocampus.
56	54	M.	A few instances of neurofibrillary changes in hippocampus. No plaques.
68	58	F.	Plaques present everywhere in cortex, most in frontal. No neurofibrillary changes.
75	57	M.	A few plaques in dentate gyrus.
80	64	F.	Many plaques in occipital region, some in cornu ammonis.
88	60	M.	Small numbers of plaques in occipital region.
97	52	F.	Small numbers of plaques in hippocampus only.
123	58	F.	Plaques present everywhere in cortex. No neurofibrillary change.
124	63	F.	Small numbers of plaques in occipital region and lingual gyrus only.
127	62	F.	Moderate numbers of plaques in cornu ammonis only.
134	52	F.	Small numbers of plaques in frontal region only.
146	50	F.	Moderate numbers of plaques in occipital region and cornu ammonis.

Alzheimer's disease. The exceptions are Cases 62, 123 and 134. In Case 62, however, the plaques are present in the post-central gyrus as well as in the frontal gyri. In the post-central gyrus they are few and widely scattered, but in the frontal region they are more numerous, particularly in the superior frontal gyrus.

With the exception of Cases 49 and 56, no instances of neurofibrillary loops and tangles were observed. In view of the small numbers seen in Case 56 and the possibility of artefacts this case can be ignored. Cases 19 and 146 were complicated by the fact that the former had syphilis and the latter a carcinoma.

(b) *Cases Over 65 Years at Death with Miliary Plaques Present.*

Seven cases showed large numbers of miliary plaques in the brain at death. Their ages are shown in Table V. They call for little comment except Cases 65 and 71, which will be reported in more detail. Clinically they were typical of a chronic mania with slowly progressive dementia. The course varied between 20 and 50 years.

TABLE V.—*Seven Cases with Clinical Diagnosis of Affective Psychosis, showing Large Numbers of Plaques in the Brain at Death.*

Case number.	Sex.	Age at onset.	Age at admission to hospital.	Age at prior attack.	Age at death
3	M.	58	66	Nil	75
26	F.	55	55	46	78
65	F.	63	65	39, 62	80
71	F.	26	40	26	73
79	M.	50	50	Not known*	84
122	F.	40	41	Not known	80
139	F.	67	67	27, 50	81

* A prior attack was reported.

The personal histories showed that prior attacks had occurred in three of the cases (Table V). No family history was available in three cases. Case 3 had seven children, of whom two were certified in a mental hospital, while Case 139 had a brother who was an epileptic. In Case 71 there was said to be insanity in the family on the maternal side.

From a pathological point of view there were few notable differences. The bodies were all thin and wasted. Case 26 also had contractures of the legs, and Case 3 a large gangrenous area on the right leg reaching from knee to ankle. Arteriosclerosis was present everywhere and was far advanced, and there were secondary arteriosclerotic changes in all the organs. There were no other pathological findings of importance. The brains did not show any marked cortical atrophy and their weights ranged from 1,110 gm. to 1,440 gm. Miliary plaques were profuse, the frontal areas having definitely greater numbers than the occipital regions, in contrast to the cases in the preceding section. Neurofibrillary loops and tangles were present in small numbers in five of the cases. In Case 139 there were calcified areas on the larger arteries throughout the body, and small areas of softening could be seen in the basal ganglia of the brain with the naked eye. Arteriosclerosis was regarded as the cause of death in all these cases.

There can be no doubt that hereditary factors played a large part in the deterioration, both mental and physical. They developed an affective psychosis upon which an arteriosclerotic dementia was imposed. At the same time

further evidences of a degenerative process in the central nervous system are found to be present after death. Although miliary plaques, and in some cases neurofibrillary loops and tangles, are found in great numbers, it is impossible to say how far these are responsible for the clinical condition, or even whether they have had any influence at all upon the symptoms. As similar findings have been described in younger cases, it is suggested that the Alzheimer changes have progressed slowly over a great number of years, and that their effects have been masked by the psychosis and the arteriosclerosis.

(c) *Cases Over 65 Years of Age at Death without Miliary Plaques.*

There were three cases, and from a clinical point of view the preservation of the intellectual faculties is well marked, in contrast to the preceding group of cases (I.B.). Thus Case 98 was reported, six months before his death, to be an exceptionally good player of draughts, and except for some defect of memory in Case 30 there was no evidence of dementia. The fact that depression predominated in this group while excitement was most apparent in the cases of group I.B. is probably a coincidence.

Pathologically, the most striking difference between the two groups is the presence of miliary plaques in the first group only. It is tempting to account for the dementia in these cases by their presence. But there are other differences which might equally well be responsible. In Case 22, for instance, the cerebral vascular system was well preserved. In Cases 30 and 98, although the cerebral arteriosclerosis was well advanced and comparable in many ways with these changes in group I.B., it is impossible to compare the degree of nerve cell destruction in the two groups of cases, or to say how much the association fibres were interfered with, or the tracts to and from the higher centres.

Thus, although Cases 65 and 30 were superficially similar from the point of view of vascular disease and hypertension, yet there were essential differences in the distribution of the cerebral lesions. In Case 65 the major areas of softening were in the basal ganglia and thalamus, while in Case 30 these lesions were present in the cortex rather than the subcortical regions. Plainly, therefore, the former case would be more likely to show gross forms of dementia. At the same time it should be remembered that miliary plaques are associated, in the cases of Alzheimer's disease and senile dementia, with an extensive destruction of the cortical neurones, and that this is regarded as the pathological basis of the intellectual deterioration. It is likely, therefore, that a similar association occurs in the senile cases, and that whatever miliary plaques occur, a corresponding destruction of nerve cells is present over and above any that may be destroyed from vascular causes. How far the disappearance of cortical neurones is due to arteriosclerosis and how far to factors which also produce miliary plaque formation it is impossible to say.

2. *Idiopathic Epilepsy.*

All except two of the nine epileptics in this series died at an early age. One died at 25 years, one at 39 years, four in the fourth decade and one aged 59 years. Only in Cases 44 and 129 were any miliary plaques or neurofibrillary

changes seen, and these two died at 71 and 84 years respectively. There is no reason to suppose, therefore, that epileptics are peculiarly liable to the parenchymal lesions of Alzheimer, or that idiopathic epilepsy has any influence upon the development of this condition.

3. *Paranoid Psychosis.*

Most of these seven cases lived to a greater age than the schizophrenics, and the histological features of Alzheimer's disease were correspondingly more frequent. Three cases over 70 years at death all had miliary plaques in the brain post-mortem, and two of these had neurofibrillary changes also. Case 131, aged 63 years at death, had small numbers of neurofibrillary baskets in the cornu ammonis without plaque formation.

In no case were the miliary plaques frequent. In Case 91 they were scattered through the frontal cortex and cornu ammonis, and there was a similar distribution in Case 132, which had neurofibrillary changes present in addition. A carcinoma was present in each of these cases, in the former in the right breast, in the latter in the rectum. Although these cases showed a considerable degree of dementia, this was regarded as of vascular origin and well advanced cerebral arteriosclerosis was found post-mortem. They died at the age of 70 and 77 years respectively. The carcinomata were the cause of death.

In Case 10 miliary plaques were present in the cornu ammonis only, and here there was also well-marked neurofibrillary change. There was little clinical evidence of dementia, and the patient died at the age of 72 years from a pyelonephritis and perinephric abscess.

These cases are, therefore, similar to those of the affective psychoses, who showed the characteristic pathological features of Alzheimer's disease developing with advancing years.

4. *Schizophrenia and Imbecility.*

Out of nineteen cases of schizophrenia (Table III), only two showed miliary plaques in the brain post-mortem. The plaques were present in small numbers only and were widely scattered. No neurofibrillary loops or tangles were seen.

In this group all cases died comparatively young, and only three lived beyond the age of sixty years. Cases 46 and 55, aged 60 and 52 years respectively at death, were those which had miliary plaques post-mortem. Two cases, aged 71 and 66 years at death, showed no evidence of plaque formation.

Although the number of cases is small, these figures suggest that the parenchymal lesions in the brain would be found in similar distribution amongst schizophrenics and cyclothymes, and that the type of psychosis had no aetiological significance.

There were two cases of mental deficiency. Both died at a comparatively early age, and no plaques or neurofibrillary changes were found in the brains. Case 15 died of lobar pneumonia and a pneumococcal meningitis, aged 31 years. Case 112 died from a lobar pneumonia, aged 43 years.

5. *General Paralysis of the Insane.*

There were an unusual number of deaths from this disease. All the cases, however, except one died before the age of 60 years. Case 30 lived till he was 61 years old. In no case was any evidence of miliary plaques or neurofibrillary change seen. It is presumed, therefore, that syphilis cut short the life of the individual before the central nervous system had time to develop these parenchymal changes.

It is noteworthy that no cases of miliary plaques occurring in general paralytics have been recorded in the literature, except by Struwe (1929), who mentions that he found them repeatedly in "old paralytics." No other indication of the age of these persons is given. It would appear, therefore, that the syphilitic toxin, at any rate, is not one which has any influence upon the formation of the plaques.

6. *Organic Dementia.*

In this series of cases there were twenty-three which were diagnosed as organic dementia (Table III). Some details of these are set out in Table VI. It will be observed that fourteen of these cases had large numbers of miliary plaques in the brain post-mortem. The question of diagnosis immediately arises.

Case 6, diagnosed as arteriosclerotic dementia, died of a cerebral haemorrhage. Arteriosclerotic changes were well marked in the brain, and there was a small recent haemorrhage into the right lentiform nucleus and a large and older one into the left lentiform nucleus. In every part of the cortex examined, however, there were enormous numbers of miliary plaques, and the neurofibrillary tangles of Alzheimer were prominent. A diagnosis of Alzheimer's disease or arteriosclerotic dementia was equally suitable in this case, but there is no doubt that it was the second which killed the patient.

Cases 25 and 67 present a similar problem, but here the miliary plaques were not quite so numerous, and no neurofibrillary tangles were seen.

The diagnosis between Alzheimer's disease and senile dementia is arbitrary in the extreme. Case 121, with age of onset at 60 years, is called Alzheimer's disease. No neurofibrillary changes were noted in this case, the duration of the illness being approximately six and a half years. But Case 126 is termed senile dementia because the onset was at the age of 66 years and the total duration about nine years. Neurofibrillary tangles were present in large numbers.

Case 150 is diagnosed as senile dementia, yet the onset of the disease at 64 years would be considered by many to be in the presenium. But the total duration is twenty-one years, and the patient died aged 85. It has been pointed out already that a course of twenty years in Alzheimer's disease has been described by other workers. Neurofibrillary tangles were present in small numbers in this case. Case 138 provides a similar argument.

The fourteen cases with miliary plaques showed dementia as the most prominent symptom, but they could be classified according to Critchley's (1942) subtypes. Nine were of the confusional type, three had depressive

TABLE VI.

Case number.	Sex.	On admission.		Duration of illness before admission.	Autopsy.	Revised diagnosis.	Military plaques.
		Age.	Diagnosis.	Date.			
6	M.	66	Arteriosclerotic dementia	22. ix. 38	18. xi. 38	Arteriosclerotic dementia	++
14	F.	65	"	29. ix. 38	22. xii. 38	"	+
24	F.	65	"	10. x. 38	13. i. 39	"	0
25	F.	61	Dementia with epilepsy	27. xi. 19	14. i. 39	"	++
40	F.	70	Senile dementia	23. i. 39	13. ii. 39	Alzheimer's disease	++
42	M.	54	Arteriosclerotic dementia	22. xi. 27	20. ii. 39	Arteriosclerotic dementia	0
61	F.	60	"	20. vii. 37	4. iv. 39	"	0
67	F.	65	"	5. v. 26	14. iv. 39	"	++
77	F.	43	Melaucholia	1. vii. 15	10. v. 39	"	+
105	F.	55	Cerebral tumour	7. xi. 38	7. ix. 39	Meningioma	0
106	M.	65	Senile dementia	28. iv. 39	11. ix. 39	Arteriosclerotic dementia	++
108	F.	84	"	11. iv. 32	14. ix. 39	Senile dementia	++
109	F.	83	"	6. xi. 36	15. ix. 39	"	++
113	F.	77	"	10. vii. 39	21. ix. 39	"	0
118	F.	75	"	15. vi. 39	29. ix. 39	Arteriosclerotic dementia	++
121	F.	66	Alzheimer's disease	21. iii. 39	14. x. 39	Senile dementia	++
125	F.	60	"	6. ix. 39	18. x. 39	Alzheimer's disease	++
126	F.	69	Senile dementia	6. ix. 33	20. x. 39	"	++
130	F.	56	Alzheimer's disease	30. xii. 35	27. x. 39	Senile dementia	++
138	F.	83	Senile dementia	29. iii. 26	4. xi. 39	Alzheimer's disease	++
142	F.	79	"	26. x. 39	19. xi. 39	Senile dementia	++
145	F.	63	Arteriosclerotic dementia	13. iii. 39	27. xi. 39	"	++
150	F.	65	Senile dementia	11. vi. 19	30. xi. 39	Arteriosclerotic dementia	0
						Senile dementia	++

symptoms, and two were manic. None could be reasonably termed paranoid. Table VII gives the case numbers under the appropriate headings.

The five who had depressive or manic symptoms were very similar to those cases of affective psychosis with secondary dementia, which were described above. They could be said to differ, perhaps, in three ways: First, they were all over the age of 65, except Case 25, on admission, and dementia was well marked already at this time. Second, no history could be obtained of a prior attack of mental illness necessitating admission to hospital, although the present illness had been in existence for several years in most cases. Thirdly, the parenchymal changes in the brain were more profuse possibly in these cases than in those classified as affective psychosis.

Further details and discussion of these cases must be left to another paper.

TABLE VII.

Predominating symptom.	Age-groups on admission.				Total.
	50-60.	61-70.	71-80.	81-100.	
Confusion . . .	125 .	6 67 .	118 .	— .	—
	130 .	126 150 .	142 .	109 .	9
Excitement . . .	0 .	40 .	0 .	138 .	2
Depression . . .	25 .	121 .	0 .	108 .	3
Delusions . . .	0 .	0 .	0 .	0 .	0

DISCUSSION.

The examination of this series of brains confirmed the suggestion, put forward as the result of the review of the literature, that the parenchymal lesions associated with Alzheimer's disease would be found in various stages of development in different cases. They were found in the majority of the cases who were over 65 years of age at death, and in many cases in the 50 to 60 age-group. In some cases the lesions were so profuse that a diagnosis of Alzheimer's disease or senile dementia was considered, and again it was found that no clinical, pathological or aetiological features were present to distinguish the two conditions, so that either diagnosis appeared equally suitable.

This discovery in the case material of instances where the parenchymal changes in the brain were in process of development seemed significant also from another point of view. For where the lesions were few, they did not give rise to any symptoms. It seemed that they must be profuse in some particular area of the brain before they affected the clinical picture, and usually this area was the frontal cortex. Further, the symptoms, when they did appear, seemed to be of "organic" origin rather than "functional." This suggested that the parenchymal changes of Alzheimer's disease always gave rise to an "organic syndrome," and that "functional" signs and symptoms must be explained in some other way when they appeared in this disease. Rothschild and Kasanin (1936), in speaking of Alzheimer's disease, have said, "In our experience the diagnosis can be made with a fair degree of certainty in the majority of instances if one remembers that the core of the clinical picture is formed by a definite "organic syndrome." It is suggested here that this "core" is alone the clinical picture of Alzheimer's disease, and that where "functional" symptoms

occur these may be accounted for in two ways. First, it has been shown in the case material in this thesis that the pathological picture of Alzheimer's disease may occur in cases of other psychosis. But it is well known that it may occur also in normal persons in old age. In these cases it has therefore no connection with the psychosis in which it occurs and is superimposed upon it. There is no difficulty in accepting this if it is admitted that Alzheimer's disease is not strictly a "disease" but is connected with the process of ageing, unless one agrees with Warthin (1929) that ageing is itself a disease.

Secondly, if these lesions in the brain occur in persons who are otherwise still comparatively young, it may be supposed that they retain some insight into their condition in the early stages, and that they realize that they are ill.

The same may be true of those cases in which the parenchymal changes develop rapidly in the brain. In normal senility the process is such a slow one, the mental deterioration is so gradual that the patient himself never realizes that there is any change, until he becomes so confused mentally that he is no longer capable of appreciating it. But if the patient suddenly finds that his memory is failing; that he no longer understands what is said to him, or does so imperfectly; that people do not seem to follow what he means when he speaks; that he has difficulty in expressing himself; then he may develop mental symptoms. The character of these symptoms will depend upon the degree of fear which he feels at his appalling plight, and the nature of the reaction of his personality to this fear. It is interesting to note that English (1942) has explained the depression, which he found in some of his cases of Alzheimer's disease, on these lines.

In accounting for the "functional" symptoms as opposed to the "organic" in Alzheimer's disease and senile dementia, there are then these two possibilities: in the first the functional symptoms are the expression of a psychosis unrelated to Alzheimer's disease or senile dementia, but the lesions characteristic of these conditions develop in the course of the illness and are superimposed upon it. In the second the "functional" symptoms result indirectly from the parenchymal lesions in the brain, and form, as it were, a secondary system and are dependent upon the personality of the patient for their quality and quantity.

If these views are accepted, then the wide variations in the clinical picture of Alzheimer's disease and senile dementia, which have been reported in the literature, and confirmed in the case material in this thesis, can be explained. In the majority of cases they are due to the fact that the pathological lesions in the brain have occurred during the course of some psychosis. In many instances, in fact, the patient has had a previous attack of this psychosis and made a partial or complete recovery. This may account for some of the "remissions" which are described in the literature, and attributed to a halting of the pathological process of Alzheimer's disease. No biopsies have been done in such cases, so that it is impossible to say whether the lesions were in fact present at all at the time.

Since the commonest types of psychosis are the affective ones, the histological changes described by Alzheimer may be expected to co-exist most frequently with these types, especially as they are particularly prevalent amongst

persons at the age of involution. This expectation was confirmed by the case-material in this thesis. If the commonest type of personality is the syntonio or cyclothymic, those cases which retain insight after the development of the lesions in the brain may be expected to react most frequently with excitement or depression.

Certain cases from the literature will illustrate these conclusions. Lowenberg and Rothschild (1931), Case 2, for instance, might well have been a manic-depressive psychosis in which the lesions of Alzheimer's disease were superimposed at a date after the onset of the psychosis. This was the case in which the patient had a remission of eight years, which she spent at home, and gave birth to a normal child. On the other hand, Malamud and Lowenberg's (1929) Case 2 was typically one of schizophrenia. It is possible that the disease of the choroid plexus accelerated the formation of plaques and neurofibrillary changes in the brain, and resulted in the appearance of these post-mortem at the age of 23 years.

It would appear, therefore, that Alzheimer's disease is a condition which may occur at any age. It has a definite pathology, giving rise to a definite clinical picture of an organic syndrome. The aetiology is obscure. In the past the condition has been known as "Alzheimer's disease" when it occurred during the individual's earlier years; "senile dementia" when it appeared in the senium, and developed rapidly when compared with the gradual intellectual deterioration of normal old age; and simply "senility" when it progressed so slowly amongst the aged that the gradual physical and mental decline was considered normal. In the first two the central nervous system has aged before the rest of the body, or else more rapidly. In the last there has been a parallel decline throughout the various systems of the organism. It must be confusing to retain three different names for the same process. Yet "Alzheimer's disease" seems inappropriate, for it is at least questionable whether the condition is strictly a disease, and "senile dementia" implies an association with senility of the whole organism, which does not necessarily occur. Here it is suggested that "Alzheimer's dementia" might be a better term to describe this syndrome.

CONCLUSION.

The formation of miliary plaques in the central nervous system and ganglion cell destruction are the pathological criteria of Alzheimer's disease, senile dementia and senility.

The clinical features are those of an organic syndrome, but these do not become apparent until the later stages of the disease, and are frequently concealed by the mental reactions of the patient, or by coexisting mental illness.

These dementias seem to be related to the process of ageing. But whereas ageing seems to be occurring abnormally early in the central nervous system in Alzheimer's disease and senile dementia, in senility it is integrated with the ageing process in other parts of the body, and so can be considered "normal."

It is pointed out, however, that it is premature to regard the presence of miliary plaques as marks of age.

It is suggested that as genetic factors are concerned in the process of ageing,

they may account for the variations in the age of onset of those changes in the central nervous system, and in their relative preponderance in females. The term Alzheimer's dementia is suggested to describe this organic syndrome.

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GENETICS IN RELATION TO MENTAL DISORDERS.*

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DESPITE the precarious vulnerability of genetic theories to partisan distortion and abuse, a report on the progress of genetics in relation to mental disorders merits introduction on a fairly optimistic keynote. It seems that in quest of a better understanding of human behaviour deviations we have finally arrived at the threshold of the age of biology as a focal discipline. There are many indications that in searching for adequate methods of biological analysis, one of the key positions of science is held by *human genetics*.

Built on the earlier pioneer work of British biologists, the knowledge of human heredity has steadily advanced in recent years. Much of this advancement was due to the methodic investigations carried on in the laboratories of this country. The progress extended to many of the medical problems of genetics, especially to those concerning mental deviations. As a psychiatrist who has long been interested in the genetic principles of human personality disorders, I fully appreciate the opportunity to be with you at this conference.

In an unbiased analysis of the potential effects of genic elements in the causation of psychopathological manifestations, one may safely proceed on the premise that basically uniform patterns in the organization or disorganization of *mental capacities* are controlled by heredity in the same manner as are those underlying the normal or abnormal developments of physical traits. From a psychogenetic standpoint, the capacity for maintaining a state of mental health is a complex biological phenomenon and not merely the equivalent of the providential absence of emotional strain exerted by the prevalence of social imperfections in the structure of modern society. At all times this capacity constitutes an integral part and central driving force of human personality development. Its existential effectiveness rests upon the individual ability to conduct a multitude of psychosomatic functions with a relative degree of vital efficiency.

Despite the rather dogmatic claims of some modern evolutionists, the *biological process of personality integration* never ceases to be subject to the laws of organic existence and structural growth. No aspect of this developmental process can be assumed to occur either by chance or by instinct. Differences in terminology do not alter the fact that the possession of instinctive energies at birth depends on the capacity for maintaining organic life, which must have begun to function before it lends itself to interpretation as to its psychological meanings and social consequences. Beyond question there would be no vital energy in any infant unless it had been produced by the operation of a complicated genetic process. It is equally certain that there is no evidence either for a self-perpetuating form of human culture that could exist in a biological

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vacuum or for any evolutionary differentiation of behavioural responses without the organic means of expressing behaviour.

For the purposes of descriptive convenience it is perfectly legitimate, of course, to distinguish between instinctual generality and acquired specificity of human behaviour, or between the separate effects of organic and social inheritance, or between specialized fixity and adjustive plasticity of mental traits. Psychologically oriented biologists may also be correct in stressing that behavioural plasticity of the human mind represents the most typical and uniquely human characteristic. There are no intransigent objections to such a generalized formulation, even if one may find it difficult to concede that "social organizations on the human level are built on the principle that an individual is able to alter his behaviour to fit any situation, whether previously experienced or new" (as has recently been claimed by the same group of writers). In fact, human personality development is so intricate a process that it permits description of the multiformity of its existential expressions on many organizational levels of appearance in the organic world.

Genetically, however, there are definite limitations to the candid or disguised tendency to think of behavioural responses of man pre-eminently in terms of *culture-personality problems* "emancipated from dependence upon inherited biological dispositions." Regardless of the degree of evolutionary emancipation achieved, mental behaviour of any kind remains a structural function of the organic nervous system. The ability to be mentally adjusted as well as the ability to react to "unadjustable" circumstances with a true psychosis must be regarded as a unique expression of the attainment of human status in the evolutionary development of man's mental equipment and cultural setting. These abilities depend basically on the common denominator of hereditary potentialities, since it can be shown without difficulty that similar mental reactions of a normal or psychopathological variety are produced by similar environmental circumstances only in a certain number of the persons exposed to them. One may say that both the tendency to become vulnerable to the destructive effect of a schizophrenic or manic-depressive psychosis and the capacity for maintaining a mentally adjusted life, despite biological and cultural imperfections, are interdependent indications of the genetically controlled inability of man to attain superhuman status emancipated from the bondage of organic inheritance (at least, till the end of the academic summer season 1947).

This statement does not mean, of course, that a person is "born" a schizophrenic or a manic-depressive, or that all carriers of either gene constellation will actually develop the trait as a matter of fate. From a genetic standpoint, the term "hereditary" applies to any mental disorder that would not originate without the presence of a certain gene combination. The implication is that some persons *have* the genetic capacity for reacting to precipitating stimuli with either a schizophrenic or a manic-depressive type of psychosis, while others *have not*. Whether or not a real psychosis will be developed by such a "predisposed" person usually depends on an intricate interplay of constitutional and environmental factors.

The effect of *environmental agents* may be instrumental in bringing such a

psychotic state to the foreground, but it should not be assumed that the suppression of an unexpressed or only mildly expressed genotype must necessarily be due to the action of purely environmental influences. Very frequently protection by other genetic background factors in a person distinguished by a strong constitution may be more important than the accidental absence of deleterious elements in the environment. In any case, there is no known constellation of plainly environmental circumstances that would produce a true schizophrenic or manic-depressive psychosis in persons who do not have a specific predisposition for either condition.

The *specific nature of the respective genes* is indicated by the observation that the incidence of schizophrenia is increased in the twin partners and other blood relatives of schizophrenic twin index cases, and that of manic-depressive psychosis in the consanguinity of manic-depressive index cases. No twin pair has as yet been found with a schizophrenic psychosis in one member and with a manic-depressive psychosis in the other, if a consistent system of classification is used. Another truism is that even of those blood relatives of a schizophrenic or manic-depressive patient who share exactly the same environment with a psychotic brother or sister or parent, only a limited number develop a psychosis. The others seem sufficiently protected against a schizophrenia- or depression-producing environment by the fortuitous absence of a specific genetic predisposition.

The statistical evidence in support of the *genetic etiology of schizophrenia* centres around the well-established fact that the disease occurs much more frequently in families which include a known case of schizophrenia (called an index case or proband in family studies) than it does in the general population, that is, in any group of persons who are not distinguished by blood relationship to such an index case. The average expectancy of schizophrenia in a general population without a pronounced tendency to inbreeding is less than 1 per cent.—0.85 per cent. to be exact.

However, the children of one schizophrenic parent have a probability of developing the disease nineteen times that of the general population. The grandchildren and the nephews and nieces are about five times more likely to show a recurrence of schizophrenia than is the average person. The schizophrenia rate of the parents of schizophrenics approximates 10 per cent. The expectancy for brothers and sisters as well as for the fraternal twin partners of schizophrenics is somewhere around 14 per cent., while that for half-siblings is about 7 per cent., and that for step-siblings, 1.8 per cent. The highest morbidity rates are found among the children of two schizophrenic parents, who have about 80 times the average expectancy, and among the identical twin partners of schizophrenic index cases, who show an expectancy rate of 85 per cent.

This distribution of schizophrenia rates indicates clearly that the chance of developing a schizophrenic psychosis increases in direct proportion to the degree of blood relationship to a schizophrenic index case—a rather convincing proof of the operation of heredity. It may be added that the morbidity rates quoted were obtained in two surveys with a total of over 1,800 schizophrenic index cases, of which 794 were born as twins, while the others were single-born.

The families of the index cases studied included a total number of about 20,000 consanguineous persons, who were uniformly classified according to their mental, social and genealogical conditions.

Regarding the morbidity rate of 85 per cent. for the monozygotic partners of schizophrenic twin index cases, it may be borne in mind that the figure expresses the chance of developing schizophrenia in a comparable environment for any adult person that is genetically identical with a schizophrenic index case, but is not distinguished by the fact of having been selected as the child of such an index case. The latter qualification needs particular emphasis, since it apparently explains the difference found between the schizophrenia rates for the two identifiable groups of potential homozygotes of the schizophrenic genotype, that is, the children of two schizophrenic parents and the monozygotic co-twins of schizophrenic index cases. These two groups differ considerably in their morbidity rates, which amount to about 65 and 85 per cent. respectively. It is only by an analysis of this difference that a satisfactory estimate can be obtained of the extent of biased sampling in a morbidity study dealing with children of schizophrenic index cases. In order to provide such a sample, schizophrenics must have had a chance of getting married and of having offspring.

It has been shown by various fertility studies that the total reproductive rate of schizophrenic index cases is not more than about half that of a comparable general population. It is also known that the decrease in fertility is especially pronounced in the deteriorating types of schizophrenia. The consequence is that milder schizophrenic cases have a better chance of reproducing a schizophrenic child than have the more severe cases. If the children of one schizophrenic parent will often be the offspring of patients with lessened severity of their symptoms, the children of two schizophrenic parents may be expected to represent an even greater selection of potential schizophrenics in the direction of a more highly resistant constitution. Such a selective process does not operate in persons who have only the distinction of being the monozygotic twin partners of schizophrenic twin index cases. From the standpoint of disease expectancy, therefore, it is preferable for a potential schizophrenic to have two schizophrenic parents rather than one identical schizophrenic twin.

Statistically no less conclusive is the finding that all the observed variations in the schizophrenia rate are correlated with *different degrees of consanguinity* to a schizophrenic index case, but not with similarity or dissimilarity in the respective *environments* of the twin partners and other siblings of schizophrenics. About one-quarter of one-egg twin pairs show concordance as to schizophrenia without similar environment, while close to one-half of two-egg twin pairs remain discordant, even if the two twins have been exposed to precisely the same environment. This observation excludes the possibility of explaining the difference in morbidity between one-egg and two-egg co-twins on non-genetic grounds, that is, by a simple correlation between closeness of blood relationship and increasing similarity in environment.

The hypothesis of *recessive inheritance* in relation to the unit genotype of schizophrenia is borne out by the taint distribution in schizophrenic index

families, showing transmission in the collateral rather than in the direct line of descent, and by an excess of consanguineous marriages among the parents of schizophrenic index cases. In two of our surveys about 5 per cent. of the index cases originated from consanguineous parental matings. Preferential support for a dominant type of inheritance was probably motivated in part by an endeavour to justify a compulsory sterilization program for schizophrenic patients. Considering the common occurrence of schizophrenia and the noticeable effect of inbreeding in certain population groups, it seems safer all around to assume that a true schizophrenic psychosis of any variety can be developed only by a homozygous carrier of the predisposition. Schizoid personality types may be either homozygotes with effective resistance to the expression of the genotype, or heterozygotes with strongly reduced resistance.

According to many observations in schizophrenic twin pairs and other sibship groups, the *variations in the clinical appearance* of the single-recessive unit factor for schizophrenia range from the mildest to the most destructive forms of the disease. The clinical variations include the episodic syndromes of a simple or catatonic variety as well as the chronic and strictly progressive forms of paranoid or hebephrenic colouring. Therapeutically it is especially important that the expression of the genotype may be fully suppressed under certain conditions. Such frustrated homozygotes may be either schizoid in personality or completely normal in outward appearance.

These differences in the phenotypical expressions of the genotype appear to be controlled by a *constitutional defence mechanism*, which is probably non-specific genetically, and certainly multi-factorial in that portion which is determined by heredity. There is a wide range of graded variations in the ability to resist the development, or to counteract the progression, of a schizophrenic psychosis. This ability has been shown by the results of biometric studies to be correlated somehow with the morphological development of mesodermal elements. The most useful correlative indicators of the constitutional capacity for mobilizing effective mesodermal defence reactions still consist in the measurements of the athletic component of physique and in the ability to maintain a stabilized level of body weight.

Our material of monozygotic twin pairs abounds with cases in which both members developed *similar types of schizophrenia* at practically the same age and with the same outcome of the disease. In such pairs no significant differences occur in regard to physical characteristics indicative of constitutional development. As a rule, the strongest resistance to schizophrenic deterioration is found in index cases with high athletic and low asthenic components of physique. The tendency to extreme deterioration corresponds to a high asthenic component, which is inversely related to the athletic component.

The situation is quite different in that relatively small group of monozygotic twin pairs whose behaviour to schizophrenia reveals some significant *dissimilarity*. If one twin remains completely free of schizophrenic symptoms, or breaks down much later than the co-twin, or shows a far more benign type of psychosis, there is always a difference between the twins in regard to physical strength and body weight from early childhood, the difference being consistently in favour of the more resistant twin. Apparently, any factor affecting either

the general constitutional equilibrium or the stability of body weight has the tendency to reduce resistance to the expressivity of schizophrenic phenomena. For obvious reasons the same agents may be expected to impede the adequacy and permanency of a spontaneously or therapeutically established remission. The list of damaging factors observed most frequently in our monozygotic twin pairs includes unusual physical or emotional strain, pregnancy, acute infections, and a too drastic form of reducing diet. Similar principles prevail in the concordant sets of dizygotic twin pairs.

On the other hand, if all one-egg and two-egg twin partners are compared in regard to similarity or dissimilarity in constitutional characteristics and the clinical course of the disease, the difference between the two twin groups approximates the ratio of 1 : 55. It would be rather difficult to obtain more conclusive evidence for the operation of a graded and, therefore, apparently multifactorially determined constitutional defence mechanism in schizophrenia.

In view of this marked variability in the expression of the schizophrenic genotype it may be concluded that the disorder, although plainly based on a specific predisposition, can be both *prevented and cured*. Therapeutically the most effective procedure would consist in a true duplication of the biological defence reactions of a strong constitution protecting a homozygous carrier of the schizophrenic genotype from developing any or a progressive psychosis. Since it is a clearly established fact that some schizophrenic processes either are arrested spontaneously or remain undeveloped completely, it is equally certain that whatever takes place in the mobilization of the constitutional defence mechanisms of such persons can be identified morphologically and somehow duplicated biochemically. The realization that our understanding of the gene actions of constitutional modifiers is still very incomplete should merely be an incentive to more concentrated attacks on the complex biological problems involved.

In schizophrenia as well as in other inherited disorders the rationale of any treatment depends on the etiology of a disease. If it is evident that the development of a certain type of mental deviation cannot be explained without a specific dysfunction produced by genically controlled elements, a more profound knowledge of these agents is bound to lead to improved methods of treatment rather than to a fatalistic state of therapeutic inactivity. The persistently presumed analogy of inheritance and incurability is merely a reflection of deep-seated general preconceptions and rationalizations which still prevail in relation to the implications of heredity. Unfortunately, even many intelligent and academically trained people have been unable so far to acquire complete immunity from one of the most obdurate taboos of modern civilization.

Generally speaking, there is no inherited disorder which is incurable merely because it is hereditary. With respect to *symptomatic* therapy, the contingencies of inheritability and curability are virtually unrelated, and certainly not exclusive of each other. A depression may clear up spontaneously, or respond to shock treatment regardless of whether it has been predominantly reactive or endogenous in nature. An encephalitic personality deviation acquired in childhood may remain incurable, while a eunuchoid condition will

lend itself to active hormonal therapy despite its possibly genetic origin. The effect of anticonvulsant drugs is considered independent of the etiologic type of epilepsy treated, and no one will claim that the knowledge of the genetic basis of schizophrenia has interfered either with the discovery of shock treatment or with any aspect of its clinical application. By analogy there is not the slightest genetic reason militating against the development of some new compound that would correct certain biochemical deficiencies in manic-depressive psychosis or amaurotic idiocy.

In fact, as far as the prospects for a *causally directed* treatment of such disorders are concerned, a better understanding of their respective genetic background factors is certain to be of immediate therapeutic value. Since we cannot expect to find a cure for a clearly inherited condition through the simple device of minimizing the effect of heredity in regard to human mental capacities, it is essential to determine how the underlying dysfunction is transmitted, reproduced and brought into play.

In general, one may say that therapeutic action against an inherited disorder is possible either by modifying—perhaps through substitution—the biochemical dysfunction which is the primary effect of the underlying main gene (Beadle), or by changing its expression through methodical stimulation of secondary modifiers and, if possible, through carefully directed management of vital environmental factors. For all of these purposes we have to know, however, how a morbid genotype is chemically constructed, under which conditions it will be able to be fully expressed, and to what extent its expressions may be controlled by constitutional resistance factors.

Apart from animal experiments, the only experimental method available for such investigations is the *twin study method*. At the present state of knowledge, the most urgent need is for the organization of long-range studies of monozygotic twin partners who are still discordant as to the earliest stages of certain types of mental disorder. It should be generally known by now that such twin pairs are of incalculable value for scientific investigation, that their occurrence is rare, and that the failure of any physician to arrange without delay for their thorough examination would represent a rather serious offence of omission. For obvious reasons, the magnitude of the task demands centralization of such twin studies in a few specially equipped institutions. It seems safe to predict, however, that important therapeutic problems of psychiatry will be near their final solution, if it can be determined why some monozygotic co-twins of psychotic twin patients develop no psychosis although they live under comparable environmental conditions; or why they do break down with a milder psychosis at some other time; or why one twin may show a more favourable type of response to the same method of therapeutic stimulation than the other twin. In all future twin studies the emphasis should be on the *cause* of such differences, rather than on establishing the fact itself that significant dissimilarities of constitutional resistance occur in similar genotypes.

It is very likely that there are "easier and quicker opportunities for satisfying the investigator by achievement" (Little). There can be no doubt, however, that properly organized genetic studies will provide the sound foundation of experimental fact upon which psychiatry can surely rely. It is also

beyond question that man's educability cannot be put to a more vital purpose than to that of discovering the basic truth about the biological phenomena which control his mental health and the emotional stability of future generations.

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MENTAL DEFICIENCY AND SOCIAL MEDICINE.*

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THIS paper is based upon the data obtained in a survey undertaken to ascertain the incidence of mental deficiency in England and Wales. My observations will be restricted to those data that are of most interest to students of social medicine.

For the benefit of those who have not read my Report (1) I will outline briefly the nature of the survey made by my colleagues and myself. We ascertained the number of mental defectives in six areas in England and Wales, each with a population of 100,000 approximately. Two of these areas were urban—one the Extra-Metropolitan Borough of East Ham, the other Blackburn. Two areas were partly urban and partly rural—Exeter with the rural area between the two Devon moors, and Chesterfield with the rural mining area in Derbyshire. The two completely rural areas were the western part of Norfolk, and the two Welsh counties of Merioneth and Cardigan. Over four years were required to do the field work and analyse the data.

The incidence of mental deficiency in England and Wales was found to be about 8 per thousand population. Therefore it is estimated that there are approximately 300,000 mental defectives in this country. This is almost double the estimate given by the Royal Commission which made surveys 25 years earlier. The disparity raises the issue whether the incidence of mental deficiency has increased in this country during the last few generations—an issue that will be recognized as one of great importance to social medicine. Much of the disparity between these two estimates, I am convinced, can be attributed to the fact that my colleagues and I were enabled to make a more thorough and complete ascertainment than the earlier investigators could possibly have done.

Whilst I do not think our data prove conclusively that there has been an increase in the incidence of mental deficiency in England and Wales in the course of the last few decades, I believe they give sound ground for asserting that there has been an increase in certain sections of the population.

One of the most definite results of our survey was the disparity between the incidence in rural and urban areas. The incidence in rural areas was at least 50 per cent. higher than that in urban areas. From whatever angle we examined our data a marked disparity was evident. Of one section of the

* This paper was read at a Joint Meeting of the Psychiatry and Social Medicine Sections of the International Conference of Physicians held in London on September 11, 1947.

population, that of school-children aged 7 to 14, we can claim that our investigation was almost complete, although not to the extent of that made subsequently by Fraser Roberts (2) of the school-children of Bath.

It is of interest to note in passing that the incidence for lower grade defectives, that is idiots and imbeciles, in rural areas is only 24 per cent. higher than that in urban areas, whereas the incidence for higher grade defectives, the feeble-minded children, is 54 per cent. higher.

When attention is first drawn to this marked disparity, it is but natural to challenge its accuracy. Surely, we say, it is easy to confuse rusticity with low intelligence, especially if the investigator be an urbanite imbued with the scholastic bias of a university education. It would lead me away from the main theme of this paper if I were to attempt to deal with such doubts, but I would refer anyone who shares them to Chapter II in my Report on "The Standards and Criteria of Mental Deficiency" that I applied in this survey.

It is not difficult to explain how this disparity in the incidence of mental defect in rural and urban areas has come about. It is associated with the rapid urbanization of England and Wales during the last century. One hundred years ago the rural population of our country was equal to its urban; to-day it is only one-fourth of the urban. During the latter half of the 19th century many a district of our countryside was almost denuded of its best human stock, and was left with a residual population which contained an unduly large proportion of persons of low intelligence. The inbreeding of such a residual population has undoubtedly resulted in an increase in the number of feeble-minded children born in these districts. It is significant that what deterioration has occurred in the intellectual calibre of our nation during the last few generations has been due, not to the deleterious environmental conditions of our large industrial towns, but to the selective biological process that has taken place in our rural areas. We should bear in mind, however, that our survey was restricted to the ascertainment of mental defectives, and did not include, as did the surveys of Sjögren and Strömberg, persons suffering from psychoses and neuroses.

Another fact that emerges from our data is the difference in the incidence of mental defect in the various social classes. In order to appreciate the significance of this difference it is necessary to emphasize the distinguishing features of higher and lower mental grade defect. The lower grade comprises idiocy and imbecility, and is of the nature of a pathological or abnormal mental condition. Higher grade deficiency, that is feeble-mindedness, is not abnormal, but merely subnormal intelligence or other mental endowment. The distribution of intelligence in the general population corresponds to the normal curve, and the feeble-minded are represented in the lowest 1 per cent. of this curve. The feeble-minded person differs from the normal person chiefly in that he is endowed with a lower measure of intelligence; the difference is of a quantitative and not of a qualitative nature and there is no clear line of demarcation.

A classification according to social status of the homes of more than 3,000 defectives ascertained in our survey demonstrates a marked contrast in the distribution of lower and higher-grade mental defect. Our classification of the

homes corresponds closely to the five-fold classification generally adopted by the Registrar-General, namely :

- Class I : Economically independent class.
- Class II : Middle classes.
- Class III : Skilled workers.
- Class IV : Semi-skilled workers.
- Class V : Unskilled workers.

The following table summarizes our classification of the homes. For the sake of simplicity, homes in Classes I and II will be grouped together as " good " homes, those in Class III will be regarded as " average," and those in Classes IV and V as " poor " homes.

Classification of the Homes of Mental Defectives. Percentages.

A. CHILDREN.

Class and grade.	I.	II.	III.	IV.	V.
Feebleminded .	1·2	10·1	27·0	36·5	25·2
Imbeciles .	5·9	23·7	36·2	19·5	14·7
Idiots .	9·5	23·0	40·5	21·6	5·4

B. ADULTS.

Class and grade.	I.	II.	III.	IV.	V.
Feebleminded .	1·9	10·4	34·8	28·5	24·4
Imbeciles .	6·8	19·9	49·2	17·4	6·8
Idiots .	8·0	28·0	38·0	16·0	10·0

This table indicates that the lower grade defectives, i. e. imbeciles and idiots, were fairly evenly distributed in good and poor homes. The approximate numbers are—30 per cent. in good, 40 per cent. in average, and 30 per cent. in poor homes. The figures relating to idiots show that the proportion in good homes is definitely higher than that in poor homes—approximately 33 per cent. as compared with 27 per cent. This is probably to be attributed to the better chance of survival the idiot child has in the good home, but possibly this is not the complete explanation.

The distribution of higher grade defectives, i. e. the feebleminded, is very different. Only about 10 per cent. were found in good homes, 30 per cent. in average, and as large a proportion as 60 per cent. were in poor homes. As many as 25 per cent. of all the feebleminded were in the lowest group—Class V homes. It is such a fact as this that makes the feebleminded of primary importance to social medicine.

Although the higher grade defectives outnumber the lower grade in the proportion of three to one, hitherto clinical medicine has paid most attention to the smaller group. Doubtless this is due to the fact that imbeciles and idiots present many conditions of great interest to the neurologist, the biochemist and the endocrinologist. For the student of social medicine, however, the higher grade or feebleminded are of dominant interest because such large

numbers of them are found in the poorest homes. All the diseases associated with chronic poverty, overcrowding and unhygienic home conditions are very common amongst the feeble-minded. The large majority of the home visits my colleagues and I made in the course of our survey were in the slum areas of the towns and to the poorest cottages in the rural areas.

Our visits to the homes made us realize one other feature in which higher and lower grade deficiency contrast greatly. Since some of the factors causing imbecility and idiocy are inherited, we were given occasionally the history that a cousin, uncle or aunt had been known to have a similar condition to the defective ascertained; but seldom did we find more than one idiot or imbecile in the same home. Usually the idiot or imbecile was the only abnormal person in the home; the other members of the family were normal and, not infrequently, of superior intelligence. In contrast to this it was our common experience to find several feeble-minded persons in the same home. A child attending school had been found to be feeble-minded; on visiting the home we found other children of the family also feeble-minded, or very dull, and the parents, if not actually feeble-minded, of low intelligence. It is scientifically correct to speak of "feeble-minded families." For the purpose of ascertainment I was often confronted with a dilemma of regarding all or none of the members of the family as feeble-minded.

We use the term "familial" advisedly, since it does not prejudice the question of aetiology—that is, whether the mental condition is due to inherited or environmental factors. Our survey, being so extensive, was too superficial to give any reliable data on such an important issue. Penrose (3) has made a thorough and comprehensive survey to elucidate the relative importance of these factors. He concludes that 29 per cent. of his cases could be attributed solely to heredity, 9 per cent. solely to environmental factors, but that in 62 per cent. of his cases both inherited and environmental factors played some part in producing the defect.

Investigators who have made surveys of mental defectives soon realize how arbitrary is the distinction between feeble-mindedness and dullness. From the scientific standpoint feeble-mindedness, as interpreted in this country, is a legal artefact. Blacker (4) has indicated the necessity for a standard nomenclature. Work in the field of mental deficiency is much embarrassed by our vague terminology. The term "oligophrenia," as interpreted on the Continent, is a better term than feeble-mindedness because it is applied to all persons whose social failure is primarily due to poor mental endowment. It applies to a much larger group of the community than the term feeble-minded. Since, however, we British are somewhat conservative in adopting foreign nomenclature, I intend referring to this larger group as the "mentally inefficient"—admittedly a clumsy and ambiguous term.

As yet we have no reliable estimate what proportion of the population of this country is mentally inefficient. Probably the best index of the number in any community is the incidence of feeble-mindedness, because the feeble-minded are an integral part of this larger section of the population. There is, however, another way of making an approximate estimate. Educational psychologists have made extensive surveys of the distribution of intelligence amongst school-

children. These surveys agree in estimating that from 8 to 12 per cent. of the school-children have less than 85 per cent. of normal intelligence. Amongst teachers there is a consensus of opinion that a child with less than 85 per cent. intelligence is incapable of learning the rudiments of education—reading, writing and counting—by the methods of instruction that have proved suitable to normal children. Unfortunately few Local Education Authorities make proper provision for the special instruction of these subnormal children, with the result that they leave school with the handicap of poor intelligence aggravated by neglect during school years. Is it not reasonable to assume that a large proportion of this 8 to 12 per cent. group of children will prove to be socially inefficient when they become adults? The point that needs emphasizing is that these men and women are social failures primarily because they are handicapped with poor mental endowment. It is the numbers in this larger group of the socially and mentally inefficient, and not the feeble-minded, who form but a small section, that give rise to many of our chronic social problems, e. g. slumdom, recidivism and child neglect. In a community based upon free competition these people are handicapped from the outset, and as nothing fails like failure, environmental factors such as physical diseases and unemployment increase their handicap in the economic and social struggle.

The men and women who gave evidence before the Royal Commission of 1904 were very hopeful that a Mental Deficiency Act would solve many of our social problems. Amongst those who gave evidence were distinguished men of the medical profession and prominent social leaders. The Mental Deficiency Acts have been in force since 1914, that is for over 30 years. It must be admitted that the hopes of the Royal Commission have not been fulfilled. Why is this?

Let us consider the application of the Mental Deficiency Acts to criminals. Several who gave evidence before the Royal Commission expressed the opinion that a high proportion of criminals were mentally defective. One of the more conservative estimates was that given by Dr. Parker Wilson; he said that 20 per cent. of prisoners admitted to Pentonville Prison showed signs of mental deficiency. Dr. Charles Goring, in his voluminous report on the "English Convict," states that "defective intelligence is one of the primal sources of crime in this country." When we come to examine the number of criminals actually dealt with under the Mental Deficiency Acts what do we find? Norwood East, who for many years was Medical Officer of Prisons in Liverpool and London, and later became Medical Commissioner of Prisons, tells us that only 42 per cent. of the total number admitted to the Prisons during the ten-year period ending December, 1931, were certified as mentally defective.

We have not far to seek for an explanation. Doctors who have had much experience of giving evidence in Court on the mental condition of criminals find that magistrates and members of the jury usually have their own standard of what constitutes feeble-mindedness. Seldom will they recognize an adult with a mental age higher than nine as feeble-minded. But large numbers of recidivists who make frequent appearances in Court have mental ages between ten and twelve, and therefore are not brought within the jurisdiction of the Mental Deficiency Acts.

It is necessary to emphasize that when we speak of the mentally inefficient we have in mind not only the feeble-minded, but also large numbers of persons who are outside the scope of the Lunacy and Mental Deficiency Acts. These persons are on the borderline, and have 70 to 80 per cent. intelligence. Our discrimination of the mental capacities of our fellow men is so poor that the majority of persons in this group pass in the crowd as normal, and their record of social failure is attributed to laziness or moral turpitude, or projected on to the broad back of a capitalistic or some other form of economic or social organization.

Without making any claim that this paper contains material that is new, I believe it is fair to say that its main theme, the problem of the mentally inefficient, is one that has received but little attention from psychiatry or social medicine. Further surveys are necessary to elucidate the nature of the problem presented by this section of the community. At present it is impossible to propound any comprehensive solution. The problem raises such far-reaching issues as the relative claims and duties of the State and the individual; and nations have very different attitudes to such issues.

We British are by nature empiricists, not only in our national, but also in international affairs. It is only very recently that the word "planning" has come into our national vocabulary. I am inclined to think that for some time yet we shall attempt to solve the medical and social problems presented by the mentally inefficient by our traditional empirical methods. We shall deal with specific problems as they become urgent. Diseases associated with insanitary home conditions attributable to ignorance and low intelligence, delinquency and high infantile mortality are some of these urgent problems. To be consistently, or rather persistently empirical—because consistency is not expected of the empiricist—in our approach to these problems we should look for individuals who are chiefly responsible for or give rise to them. There is one person who is in a key position, namely, the mentally inefficient mother. Without any wish to appear facetious, I suggest it would be well if some doctor of great experience were to give medical students, soon after they qualify, a talk on the problems the unintelligent mother presents to the general practitioner, the medical officer of health, and the psychiatrist. In passing we may note that such mothers are not altogether absent from the wealthy classes. I feel sure such a talk would do much to prevent the young doctor wasting a great deal of his skill, time and energy. One instance may be cited here—the disheartening experience of the medical officer of health in the eradication of scabies. A school child found to have this condition can usually be cured in a few days; but when this child lives in a home that is filthy, because of the mother's incapability, then the permanent eradication of the disease becomes a difficult problem. Even when medicine has discovered a sure remedy, there is much to be done before the remedy can be effectively applied in the general community.

The newly formed body, known as the Family Service Unit, organizes a voluntary service to assist mothers who find themselves unable to cope with their domestic and family responsibilities. Presumably much of the voluntary work will be done in what is now known as the homes of "Problem Families." This experiment is of great interest, and whether it succeeds or does not, it

cannot fail to give us valuable information about the mentally inefficient mother.

At a joint meeting of the Sections of Psychiatry and Social Medicine, it is natural to ask the question, "What contribution can the study on mental deficiency make to social medicine?"

After reading some of the text-books and recent contributions on social medicine, the general impression received is that at present its philosophy is essentially that of the environmentalist. This is not surprising. So many diseases and premature deaths are attributable to environmental factors which should and can be eliminated that social medicine focuses its attention, for the present, upon these. There are still many conditions in the homes of the working classes, in factories and mines, that can be much improved.

Statistics show that in recent decades rapid strides have been made in reducing the mortality and morbidity rates of many diseases. The specific feature that interests us at the moment is that with several diseases the rates fell rapidly for several decades in succession, but for several years recently little progress has been made. It is as if a residuum or hard core has been reached that cannot be eliminated by the methods hitherto successful. I suggest that the study of mental deficiency may prove helpful to social medicine when it comes to deal with these residua or hard cores.

To illustrate this, let us consider the statistics of infant mortality in England and Wales. The infant mortality rate, i. e. the number of deaths of infants less than one year of age per thousand live births, was 153 for the decade 1891 to 1900. This rate fell to 100 in the decade 1911 to 1920, and to 72 in 1921 to 1930. In 1939 it was only 50, that is, less than one-third of the rate in 1900. Since 1939, however, the rate has remained much the same; it seems as if we are getting near or have actually reached the hard core of this problem.

At the moment we have in mind more especially the differential infant mortality rates of the various social classes. This is best exemplified by restricting our attention to the mortality rate of children between the age of four weeks and one year. It is amongst children of these ages, and not for still-births or neo-natal cases, that the rates in the five social classes differ most.

The mortality rate amongst these children for the period 1906-1910 was 77 per thousand live births. In 1920 the rate had fallen to 53, and in 1930 it was only 36. By 1939 it had fallen to 22 per thousand live births, but since then there has been little reduction. An analysis of these mortality rates for the five social classes is of special interest. In 1939 the figures were approximately as follows:

Class I (independent)	Rate per 1,000 live births	8
Class II (middle class)	" "	11
Class III (skilled workmen)	" "	19
Class IV (semi-skilled workmen)	" "	24
Class V (unskilled workmen)	" "	30

The infant mortality rate for the poorest social class is about four times that for the best social class. Moreover, statistics show that although the

general infant mortality rate has been decreasing rapidly during the last 50 years, the disparity between Classes I and V has increased. A reasonable interpretation of this increasing disparity is that the normal and more intelligent mothers have derived immense benefit and have taken full advantage of the medical knowledge disseminated amongst the general public and of the pre-natal and infant clinics that have been established, whereas the mothers of the poorest social grade have not benefited to nearly the same extent. It is to this lowest social grade that the mentally inefficient mothers belong, and their importance in this particular problem is greatly increased by the fact that they are the most fertile group of mothers. Probably some new method of procedure will be necessary before any further substantial reduction can be made in the mortality rate of the children of these mothers.

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SOCIAL SURVEYS.*

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I AM very grateful to the Committee of this Conference for giving me the opportunity to say a few words about the aims and methods of social surveys. I must, however, confess that I was somewhat astonished when I got the invitation, because everybody interested in this topic knows that the most eminent experts within this field are English. It would, therefore, seem unnecessary to ask a foreigner to read this paper, and after having heard the lectures of Dr. Lewis and Dr. Blacker I feel still more convinced that I shall not be able to add anything of importance to their excellent presentations.

The Committee have asked me to present some investigations of mine as a basis for a discussion of methods for ascertaining the amount of mental disability in a population and relating it to the social background. This investigation, which was performed some years ago in the Danish island of Bornholm, I should not like to compare with the great surveys of Dr. Lewis and Dr. Blacker, but as it does represent other methods it could be used for a discussion and comparison of methods.

Unfortunately these methodological questions usually seem rather uninteresting to those who have not taken active part in the practical work within this field. On the other hand, I must say that it is quite impossible to estimate the value of the results of a social survey when you don't know exactly which method has been used. Sociologists and clinicians are very much interested in the results of the surveys, but usually rather indifferent as to the methods used. The investigators themselves, on the other hand, often become so absorbed in the methodological questions that in some cases they apparently do not care if they get any results at all. In my report I shall try to strike a balance between these two tendencies.

I hope to be forgiven for making a few historical remarks. Research within our field has been made principally by medical statisticians and by geneticists. The first group are used to estimating the incidence of a disease or an abnormality by counting people dying from it, or coming to hospital for it, or getting some kind of pension for it, but in general they do not try to count people who are staying at home with their disease without trying to get it cured, or to have a pension for it. From some restricted sociological viewpoints these persons may be said to be without the social criteria of the disease, but from a biological viewpoint this is obviously false. It is quite natural then, that geneticists especially, who are interested in revealing every single case of the disease in a given population, have been obliged to find other methods of estimating the incidence of diseases in the general population.

* A paper read at the International Conference of Physicians, London, 11 September, 1947.

In the early history of human genetics it was thought to be sufficient to study the families of the sick *propositi*, but soon it became obvious that an exact knowledge of the morbidity in the general population was necessary for the sake of comparison. About fifty years ago the first investigations of this kind were made by Jenny Koller in Switzerland and Jost in Germany, and a few years later they were followed by Otto Diem. Their principles of sampling were not very good, and their results consequently not very reliable. No greater advance in the field took place until in the late twenties Rüdin, Luxenburger and their pupils in Munich became interested in the problem and initiated a series of investigations. Luxenburger was concerned especially with the methodological questions. I think it fair to say that most of his principles were sound enough, but that often they were used in ways which gave quite unreliable results. The most severe objection to these works of the Munich School is that the samples were generally much too small. The confidence in the percentages computed by these authors often depended on not calculating the mean errors. On the other hand, these investigations were of importance in so far as it was possible to join the small samples to larger samples that gave sufficient numerical basis for determinations of the morbidity in the general population.

The principle of these methods is well known; a number of *propositi* were chosen, as arbitrarily as possible, and then the incidences of different traits among their relatives were determined; in all cases the incidences among parents and siblings, in other cases among the children and among the siblings of the parents, too. Afterwards the incidences were compared with the corresponding incidences among the relatives of abnormal *propositi*. This method of computing the "empirical genetical prognosis" (*empirische Erbprognose*) has given many valuable practical results. It was soon apparent that in many cases differences in social prognosis were very great. It was obvious, too, that here was a method which made it possible to get an impression of the social importance of many diseases. But still it was rather difficult to compare the results of these sampling methods with the results of the census investigations usually made by sociologists and psychiatrists. A great number of census investigations have been made during the last 25 years. Some of them, especially in Germany and Switzerland, aimed at ascertaining all cases of mental abnormality. Unfortunately the populations that had been chosen were not good samples. The Swiss populations were rather small, and with much inbreeding in them. Both these populations and the Bavarian populations investigated by the Munich School were heavily tainted with goitre and cretinism.

Eighteen years ago the Swiss psychiatrist Brugger made a wide investigation in Thuringia. In an area comprising 38,000 inhabitants he tried to count all cases of mental aberration. He found only 1.3 per cent. such cases—a percentage so small that it is quite obvious that Brugger had not got hold of all the cases he searched for. A few years later Brugger made a similar investigation in a Bavarian area comprising 6,000 inhabitants. This time he tried to investigate all persons living in the area. He found 7.5 per cent. of mental disorders.

It is quite clear that regarding mental deficiency the investigations of Brugger could not be compared with those of E. O. Lewis, whose material was a hundred times greater and was investigated to a great extent with mental tests. Further, Lewis's samples were probably representative, while Brugger's area was rural and to a great extent afflicted with cretinism.

These investigations of Lewis and Brugger were the most recent models for further studies when in 1931 I began to plan my survey of the island of Bornholm.

I think I must say a few words about the reasons I had for choosing this island for investigation. Bornholm belongs politically to Denmark, but geographically to Sweden. It is situated to the south of Sweden and about 90 miles south-east of Copenhagen. Anthropologically the population is identical with that of Denmark and Southern Sweden. It is quite understandable that the Bornholmians have been to a certain extent isolated from the rest of Denmark, and their language has a definite accent, which is easily distinguishable from all other Danish dialects. The population is very homogeneous and there is no intermarrying of any importance. The island has forty-six thousand inhabitants who know each other fairly well. It is, therefore, always rather easy to get sufficient information about any Bornholmian. If they leave Bornholm you can trace them by their dialect. In many Bornholmian families extensive records of their ancestors and other relatives are kept. No wonder, then, that this island is an excellent object for a geneticist. The island has its own general hospitals, but severe psychiatric cases have to be sent to a mental hospital on Seeland. During the last hundred years the psychotic Bornholmians have always been sent to the same mental hospital.

There could be no doubt, then, that this population must be fine material for a psychiatrist interested in genetics. It would be possible to trace most families through several generations, and it would be easy to determine the morbidity of the Bornholmian general population for comparison. On the other hand, it was not certain that this population was representative of the Danish population as a whole. This, however, turned out to be most probable. In fact, the population of Bornholm in most respects is similar to the average Danish population outside Copenhagen. One half of the inhabitants are living in small towns, the other half in rural districts. The social state is just like that found in other parts of the country. In Denmark few are very rich and few are very poor, and this holds true of Bornholm too.

Diseases seem to be of the same kind and frequency in Bornholm as in Denmark as regards somatic diseases as well as mental diseases. All figures known about these frequencies are on the average Danish level. With regard to the number of persons admitted to psychiatric hospitals, there is the best possible accordance, too. It should be possible, then, to deduce from the findings on Bornholm the state in other non-metropolitan areas in Denmark.

It was of great importance for medical investigations on Bornholm that the attitude of the population towards hygienic measures has for a long time been understanding. Many of the inhabitants have seen that most diseases can be effectively fought on Bornholm because of its isolated geographical state. They have seen that tuberculosis in their cattle has become completely eradi-

cated, and the same fate now seems to reach human tuberculosis. So it is quite natural for the Bornholmians to take active part in battles against disease.

My personal investigations on Bornholm began in 1933. Before that I had been assistant to the mental hospital to which the Bornholmian psychotics are admitted. At that time I knew already most cases of severe psychoses from that island. In 1934-35 I held a position in the general hospital of the capital of Bornholm, a town called Rønne. In this hospital nearly all psychiatric cases of the island were treated. Coming in touch with a great deal of physically diseased people and their relatives, I had the opportunity of knowing the population fairly well. I came in touch with all doctors and many municipal officers of the island. Furthermore, about 1,000 homes were visited. Having no social worker I had to make all visits personally.

I made six series of investigations. The three first of them aimed at determining the morbidity of the general population, using the *propositus* method of the Munich School. The three groups had about 150 *propositi* each. The first group consisted of patients admitted to the general hospital for non-psychiatric reasons. The mental health of these *propositi* was examined, and so was the health of their siblings and parents. The second and third series of *propositi* consisted of all persons living in Rønne on a certain date and being 33 or 34 years of age. Their siblings and parents were examined. The reason for selecting the two last-named groups of *propositi* was a mere practical one; at that time a great tuberculosis investigation was going on on the island, all people between 16 and 35 years being examined. It was very easy, then, to get in touch with these people. For psychiatric purposes the two oldest age groups were the most suitable.

When these three groups were added to each other there were 427 *propositi* and 1927 siblings. Mental abnormality was found in 12.4 per cent. of the *propositi* and 5.0 per cent. of the siblings. The first-named incidence must be said to be amazingly high, most of the *propositi* being rather young. The difference between the incidences among the *propositi* and among the siblings could only partially be explained by the fact that the *propositi* had been under the closest personal observation. Another point of importance is that although the first group of *propositi*, the patients of the general hospital, were not admitted for psychiatric reasons, there might be a positive correlation between admission to general hospitals and mental abnormality.

Of the siblings 2 per cent. were, or had been, psychotic and 0.7 per cent. were feeble-minded. Among the parents of the *propositi* the incidence of psychoses was higher, and that of mental deficiency lower.

This material was used for a small calculation of the probable effect of eugenic measures towards the incidence of psychosis. Among the siblings of the *propositi* were found 36 cases of psychoses, but only eight of these had psychotic parents, although there were 27 psychotics in the parental generation. If all psychotics in the older generation had been sterilized, the incidence of insanity in the following generation would have declined from 1.9 per cent. to 1.5 per cent. Unfortunately most of the children had been born before the outbreak of the parental psychosis. Only in one case could one say that

sterilization had possibly prevented a case of psychosis from appearing in the next generation. This was undoubtedly a rather disappointing result.

As to the incidences found in this material, there was good agreement with other material published up to that time.

The fourth series of investigations comprised a census of a small district of Bornholm, a parish called Rø, containing about 1,000 inhabitants. This district was chosen because it was extraordinarily easy to get good information about every inhabitant. The result was that 12 per cent. of all persons above 20 years were (or had been) mentally abnormal; 2·8 per cent. were psychotics or ex-psychotics and 3·1 per cent. were mentally deficient. This survey was, in fact, a social survey. The social state of all inhabitants was thoroughly investigated. It came out that only in 60 per cent. of the cases of mental disorder had this disorder had any influence on the social state of the patient.

It is a rather difficult thing to compare the results of *propositus* investigations with those of a census. The differences are obvious. A census only comprises living persons, while a *propositus* investigation comprises the deceased too. Mentally abnormal persons, especially psychotics, have a greater mortality than the average population, and they will therefore not be adequately represented in a census. If a comparison of the results of the two kinds of investigations must be made, it will be necessary to compensate the excess in mortality of the psychotics. Generally it is impossible to do this, but in a restricted area, where it is possible to ascertain all cases of psychoses which have appeared during the last two generations, the amount of the compensation can be calculated. The demographic conditions in our material allowing such a procedure, a special method was devised. It was applied with the result that it could be said that our census investigation had given almost exactly the same incidences for the endogenous psychoses as had been found in other countries by *propositus* methods. The excess of mental disorder found in other materials was due to the occurrence of psychoses or defects that are generally not so easy to identify as the great endogenous psychoses.

The fifth investigation consisted in an attempt to identify all persons on Bornholm living on a certain date and suffering from (or having suffered from) psychosis. An attempt was made to ascertain not only persons who had been treated in hospitals, but also persons who had been treated at home or those who had not been treated at all. Among the 46,000 inhabitants of the island were found 525 such persons, that is, 1·14 per cent. Of these, 0·31 per cent. were in hospitals at that date, 0·4 per cent. were still psychotic, but not in hospital, and 0·44 per cent. had recovered from their psychoses.

If conditions were the same in Bornholm as in the rest of Denmark it was to be expected from these figures that in all Denmark 11,500 persons must be in mental hospitals or psychiatric departments of general hospitals. In fact 11,000 persons were found in such places. The agreement seems to be as near as possible. There would, therefore, be good reason to assume that other incidences could be generalized. In Denmark, therefore, there would presumably be about 14,000 psychotics who were not in hospitals and 16,000 persons who had recovered from psychoses. The population of Denmark amounted to 3,600,000 at that time.

In the sixth investigation we endeavoured to ascertain all cases of psychoses appearing in Bornholm since 1856. It turned out that only the cases beginning after 1890 could be detected with a sufficient degree of certainty. There were 900 such cases, 20-30 per cent. of them being schizophrenics and about 20 per cent. manic-depressives. The relatively great incidence of schizophrenia probably means that in earlier times only the more severe psychoses were always recognized. In the last generations there is a prevalence of psychogenic reactions.

An analysis of the variations of incidence during the 40 years preceding the investigation showed that there had been a rather slow increase of first admissions in this period. During the first 30 years the rate of first admissions for psychoses was about 4 out of 10,000. After 1925 there was a more rapid rise, so that in 1935 the rate was 10 out of 10,000. This rise was predominantly due to admissions to hospitals and clinics other than mental hospitals.

Among the six series of investigations there was, of course, a good deal of overlapping. Most of the *propositi* appeared in more than one series. This overlapping served as a good basis of control.

As a total result of the different surveys it could be mentioned that about 14,000 persons were registered, 1,700 of these being abnormal mentally.

Since 1938 I have had no opportunity to continue the investigations on Bornholm, but Dr. K. H. Fremming has made a survey there during the last eight years. His method was quite different from those applied by me. He used the so-called Klemperer method, which was first used by Klemperer in 1933. Klemperer chose 1,000 *propositi* quite arbitrarily from the birth registers of Munich. All his *propositi* were born between 1880 and 1890. He tried to make a *katamnesis* of them with special respect to their mental state. No doubt this method theoretically is very adequate, but practically it is rather difficult to handle, because it is not possible to trace all *propositi*. Klemperer only found 70 per cent. of them, and his results consequently were rather uncertain. It is quite clear that this method could only be used successfully in a population where individuals are easy to trace. Fremming's *propositi* were 5,500 persons born in Bornholm in the years 1883-87. He succeeded in ascertaining more than 92 per cent. of the *propositi*, most of these having passed their 55th year. He got his information from municipal registers,

Dr. Fremming's Investigation (Katamneses of 5,500 Persons Born 1883-1887).

Mental disorders (all kinds)	.	.	.	.	12	per cent.
Psychoses	.	.	.	.	4.1	"
Schizophrenia	.	.	.	.	0.9	"
Manic-depressive psychosis	.	.	.	.	1.6	"
Epilepsy	.	.	.	.	0.5	"
Inferior intelligence	.	.	.	.	3.0	"
I.Q. below 75	.	.	.	.	1.3	"
Psychopathic constitution	.	.	.	.	3.1	"
Psychoneurosis	.	.	.	.	2.2	"
Criminality	.	.	.	.	1.7	"

parish registers, the relatives of the *propositi*, their neighbours, their doctors, and so on. He had to make about 2,000 visits. Fremming made a thorough demographic analysis of his material both in medical and in social respect, and he was especially interested in diseases of social significance. The incidence of psychoses was 4.1 per cent., namely, 3.0 per cent. for males and 5.3 per cent. for females. The risk of schizophrenia was 0.9 per cent., in good accordance with other investigations. The incidence of manic-depressive insanity, however, was much greater than usually found by others. This incidence was 1.6 per cent. to 1.0 per cent. for males and 2.2 per cent. for females. Fremming found many cases which had never been to hospital. Only 15 per cent. of these patients were psychotic on the date of the investigation, and only 3 per cent. were in hospital. I am inclined to believe that this incidence of manic-depressive psychosis found by Fremming could be generalized.

For epilepsy he found a risk of 0.5 per cent. and for reactive psychoses 0.9 per cent. Of the last group 70 per cent. had been mentally abnormal before the onset of the psychosis. 3 per cent. of the *propositi* were of inferior intellect and 1.3 per cent. were definitely feeble-minded, that is, having an intelligence quotient of less than 75. 3.1 per cent. of the *propositi* were of a psychopathic constitution. Among the males 3.5 per cent. were alcoholics. Of the drunkards 49 per cent. were mentally abnormal in some other way too; 26 per cent. were psychopaths and 16 per cent. were lawbreakers. 2.2 per cent. of the *propositi* were suffering from (or had been suffering from) psychoneurosis.

As a general result of his investigation Fremming mentions that 12 per cent. of his *propositi* had been mentally abnormal, which is in the closest possible agreement with the percentage found by me in the same population, but by means of fundamentally different methods.

In a survey of the social importance of mental disorder Fremming states that among the psychotic and ex-psychotic 38 per cent. were unable to work; among the other abnormals 27 per cent. Of the psychotics 20 per cent. were in hospital or in asylum; of the others only 3.5 per cent.

The incidence of organic nervous disease was 1.8 per cent.

With respect to criminality Fremming found an incidence of 2.8 per cent. among males and 0.6 per cent. among females. 47 per cent. of the criminals were diagnosed as mentally sound; 28 per cent. had a psychopathic constitution; 10 per cent. were of inferior intellect.

In Fremming's material 1.5 per cent. of the deaths were due to suicide. Half of these persons were psychotics, one-fourth were mentally abnormal in some other way, and only one-fourth seemed to have been healthy.

Next I should like to mention a recent survey made by the Danish Social Ministry. The investigation has not been finished, and no results have been published as yet, but the Ministry has allowed me to mention some of them on this occasion. The aim of this survey was an analysis of persons who have got support from the municipality for an unusually long period and not for obvious medical reasons. The *propositi* were 1,100 persons, who, from April, 1944, to April, 1945, had received poor-law relief for more than 8 months. The *propositi* were chosen quite arbitrarily from different areas in Denmark, representing all kinds of populations. For every *propositus* a complete social

anamnesis was made by municipal officers. Then a social worker gathered more details regarding the anamnesis. All institutions that had been in contact with the propositus were asked to give information about him, schools, employers, colleagues, hospitals, etc. A great majority of the propositi were then examined by two doctors, specialists of general medicine and psychiatry respectively. In many cases other examinations were made, e.g., X-ray, electrocardiogram, ophthalmological, and others.

This material having been collected, each case was made the subject of a discussion by a committee consisting of four or five doctors and two officers of the ministry. In all cases an attempt was made to find the cause of the propositus's failure, and the possible measures to improve his social condition. Not all cases have been finished as yet. The figures given in the following may therefore be somewhat altered later on. As will be seen in the table the morbid

*Danish Investigation of Persons Receiving Municipal Support for Long Periods.
Causes of Social Failure.*

Causes.	Males, %	Females, %
Illness :		
Mental	50	31
Physical	34	28
Alcohol or drug addiction	1	0
Social :		
Divorce	0	17
Husband in prison	0	1
Worn out	1	5
Many children	5	6
Children cannot be taken care of	0	3
No working possibilities in profession	2	0
Wages too low	1	3
Lack of initiative	1	3
Dislike of work	1	1
Previous criminality	2	0
Careless mode of living	1	0
Other causes	1	2

causes of inefficiency were quite dominating. Among males mental disorder was a principal cause in 50 per cent. of cases, among females in 31 per cent. All morbid causes together were responsible for the social failure in 85 per cent. in males, in 59 per cent. in females. Among females the strictly social causes were of a relatively greater importance than among males. The principal difficulties arose for the females in connection with divorce, the wife being unable to get a position of her own at once after divorce. With respect to other causes, there were no significant differences between sexes.

It would be seen from the headings of the "social causes" that some of these in some way or other are connected with specific mental traits of the propositus, these, however, not being of a kind which could be said to be definitely morbid.

I think of the headings "lack of initiative" and "dislike of work." It might become the subject of an interesting discussion whether these conditions could be said to be normal or not.

The rates given in the table comprise the *principal* causes only; in a great deal of further cases pathological causes were contributing to the social failure.

As to the possibilities of work for these propoiti the committee arrived at the following conclusions: Of males 14 per cent. had full power to work, 56 per cent. had a reduced power, and 30 per cent. were without working possibilities. For females the rates were 10 per cent., 50 per cent., 40 per cent. respectively.

This material was tainted by the fact that during that period the degree of unemployment in Denmark had dropped to a minimum. It was therefore quite natural that a material consisting of people who could not be employed at a time when employment conditions were optimal must to a great extent comprise extreme minus variants.

In Finland during the last ten years two great social surveys have been made. The results were published by Kaila in the *Acta psychiatrica et neurologica* in 1942. The first survey was performed by the Social Ministry, which wanted to know how many insane and mentally deficient persons were living in the country. Seventy-two boroughs and parishes were chosen arbitrarily as samples. Together they comprised 12 per cent. of the Finnish population. All hospitals and asylums in the areas had to report their patients. The police and the different municipal officers made lists of all persons who they thought were abnormal mentally. By these means about 5,000 persons were reported, and all these persons were examined by psychiatrists. Finally the incidence of psychoses was found to be 0.65 per cent., and that of mental deficiency to be 0.44 per cent. Of course these rates must be regarded as minimum rates, because only such persons were reported who were obviously insufficient.

The second survey was made by the bureau of social insurance. All invalids in the country were asked to announce themselves, and all municipal offices and hospitals, homes, etc., were asked to register all socially insufficient persons. By these means the incidence of psychoses was found to be 0.79 per cent., and that of mental deficiency was found to be 0.44 per cent. The results were thus quite similar to those found in the first investigation. It seems as if the criteria used in the two surveys have been practically the same.

Kaila found that mental deficiency and epilepsy were not equally distributed over the country. He tried to find out which social characteristics these incidences were correlated to, and he stated that the incidences were highest in those areas that had the highest birth-rates, the highest mortalities, the habitations of most inferior quality, the greatest numbers of persons supported by the municipality, and the most extensive emigration. It was quite striking that the feeble-minded were much less inclined to change their habitation than were the average population.

In Norway there has for several years been a very adequate registration of insanity. Ødegaard has made very thorough statistics of admissions to psychiatric departments during a period of ten years. His work was published

last year in the *Psychiatric Quarterly*. I believe it is one of the most reliable statistical studies of this kind.

It seems as if I prefer the Scandinavian investigations, as I have now for a while talked only about them. I hasten to stress that this is not because I believe them to be of a better quality than other investigations. The reason is that I know this material comparatively well, and that I can estimate to what degree the results are reliable.

It is well known that in America some great psychiatric surveys have been made lately. As an example, I need only mention the investigations of Dayton in Massachusetts. It is not, however, always easy to say what the figures of Dayton really mean. Of course the rates of the total group of psychoses must be rather reliable, but Dayton himself stresses that the delimitation between the diagnostical sub-groups is very uncertain, the diagnostical criteria of the various hospitals being hopelessly different. In some state hospitals 9 per cent. of admittances are schizophrenics, in others 41 per cent., which cannot solely be the fault of the patients.

If I should say a few words about the ways and means of future social surveys I should like to stress that a combination of intensity and extensity of the surveys is essential. The surveys must be so big that we may be allowed to generalize from them, but we must know the structure of the material very closely. The surveys will generally be of such an extent that it will be necessary to have a staff of collaborators, medical and non-medical. It is a good thing, though, if the leader of the investigation takes active part for a period in the routine work, so that he comes to know every link of his future conclusions. Regarding the medical co-workers, I want to stress that field-work of this kind is, according to my opinion, the best way of clinical training which a psychiatrist can have at all. It ought, therefore, not to be difficult to get the best young psychiatrists as helpers in these surveys.

With regard to the registration, it is a good thing to bear in mind that it should be possible to use the material for other purposes in the future. If, for example, a new potent kind of therapy should be invented, it would be of the greatest importance if at once you could see from the material how many persons ought to be treated with this new therapy, how many doctors and hospital beds would be necessary for this purpose, how much money it would cost, and how much it would save. Generally it is quite obvious that it makes a good impression on those who have to find the money for a prospective therapy if you can give them reliable figures as to the amount and the "interest" of the money required.

I am very glad to have heard Dr. Blacker's remarks about the problem of terminology. Of course this is a point of exquisite importance. With some excellent surveys it is true that practically we cannot use them because we don't trust the diagnostical criteria. It is certainly to be hoped that the committee of the World Health Organization will succeed in establishing an international psychiatric terminology. The preliminary list of diagnoses published in April, 1947, seems to be of high quality, and it ought to be possible for all psychiatrists to agree with the main points of it. Of course I must agree with Dr. Blacker that the sub-groups of the psychoneuroses are not

convincingly differentiated from each other, but if every label were followed by a short description, as Dr. Blacker proposes, and as has been practised in the *Statistical Guide* of the State Hospitals of New York, much misunderstanding could be saved.

Of course you should not force individual psychiatrists to give up completely their own terminology, which each always think to be the best in the world, but you could ask them gently and firmly to use in their publications—or in the tables at least—not only their personal terminology, but also a “translation” into the international terms.

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PSYCHOPATHIC PERSONALITY AS A GENETICAL CONCEPT.*

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IN recent discussions of the subject by Curran and Mallinson (1) and by Kinberg (2), emphasis has very properly been laid on the inextricable confusion that at present prevails in the use of the term "Psychopathic Personality." Very many attempts have been made, for instance by Henderson, Cleckley, Cheney, Levine, Bullard and others (1), to characterize a syndrome. The characteristics of the syndrome have been seen in the make-up of the personality and its social relationships. But every authority disagrees with every other, and if there is any feature in common in all the definitions that have been provided, it is a lasting, but otherwise unspecified, incapacity to build up satisfactory social relationships. The confusion has gone so far that Kinberg has suggested that the term should be dropped altogether, particularly as it promotes a fatalistic attitude in the clinician and does not dispose to enthusiasm in therapy.

This is, I believe, going too far. If we were to drop the term altogether, we should be obliged to invent an equivalent or to hamper ourselves in the description and categorization of a whole series of clinically very important phenomena. If we return to a definition propounded by one of the earlier workers on the subject, Kurt Schneider (3), we will attain a necessary clarity, and be provided with a useful framework for classification. Schneider pointed out that in our use of the words normal and abnormal we tended to confuse meanings of two quite different kinds. Normal could be used either to signify that which was healthy and satisfactory, or to designate phenomena which fell within a certain range of observations of the population at large. Thus according to the first view a mild degree of dental caries is abnormal, according to the second, normal. Schneider goes on to show that the use of "normal" on the first, which is an ideal scale, leaves us at the mercy of changing opinions and of concepts of value which can never be scientifically validated. If we confine "normal" to its second meaning, we have a firm basis of observation on which to rely, and there will be uniformity between workers in the use of the word. Schneider points out that there is a very wide individual range, and that abnormal, i. e. falling beyond this range, means essentially nothing more than unusual. In our experience of life we run into men and women of characters that differ but little from the average of their fellow men, and others who differ widely, who have very well-marked character traits. In some respects variation may occur along lines which have but little medical or social significance, e. g. musical ability, but in other traits there will be medical and social consequences. Schneider proposes using the term "psychopathic personality" to categorize those abnormal or unusual persons who are

* A paper read at the International Conference of Physicians, London, 9 September, 1947.

from time to time likely to find themselves in the consulting room of the psychiatrist, i. e. those persons who are likely to suffer under their abnormality, or unusualness, and those who are likely to cause society to suffer. From this point of view there is no distinction between these two types except of convenience. At one time a man may be suffering himself under the consequences of a strongly marked temperamental trait, and consequently showing himself as ill and a patient; at another he may be causing society to suffer, and thereby coming into conflict with his fellow men, perhaps to be regarded as, say, a criminal.

It is to be noted that these two forms of behaviour have been embodied in Anglo-Saxon psychiatry as concepts of a radically different kind, and a man of the first kind has been regarded as neurotic, and of the second kind only as psychopathic. This has probably been largely because attention has been diverted from the constitutional aspects and devoted to the mechanisms of illness. The work of Freud and his followers has caused immense emphasis to be laid on the dynamic factors which lead to a neurotic illness, and the whole of the explanation of behaviour of this kind has been seen in these mechanisms. There is, however, now a considerable body of work which suggests some reorientation of our views. The rôle played by psychological experiences in infancy and childhood in predisposing towards an eventual neurotic reaction, and by the proximate causes which eventually precipitate breakdown, remains important; and factors of these kinds must still have a considerable part allotted to them in any adequate consideration of the aetiology of these states. But it has also been shown that hereditary factors play a part in the predisposition, and that all men are not equally alike in their susceptibility to abnormal behaviour.

Furthermore clinical experience suggests that the distinction between psychopathic and neurotic behaviour is artificial. We may take as a prominent example manifestations of a hysterical kind. The type of case which is familiar to all clinicians is that of the woman who is constantly attracting medical attention because of overt symptoms, paralyses, tremors, pains, etc. In this sense she is neurotic. But she also insists on great attention being paid to her illness by other members of the family, interferes in their affairs in an egoistic way, and is indeed causing society to suffer through her abnormalities. In this sense she is psychopathic. We can, I submit, only lead ourselves into confusion if we insist on making qualitative distinctions of this kind, and regard them as of more than momentary and pragmatic validity. The confusion of thought engendered is constantly hampering us in practical day-to-day work. Let us take the case of the epileptic. Because of his fits he is probably receiving medical attention; but he is also very likely to suffer from mood variations often of an explosive kind. These may lead him into conflict with society, and to his treatment, not by medical men, along lines which have no medical justification. But there can be little doubt that the mood changes as well as the fits are the consequences of an altered cerebral metabolism, and equally proper subjects of medical research and treatment.

Earlier workers have adopted the Schneiderian view, but have proceeded from it to a classification of humanity into types, such as the introvert and the extravert. While attempts of these kinds have certainly led to the advance-

ment of knowledge, they have on the other hand led to an excessive schematization, and the categorization of humanity into water-tight compartments. Modifications of this approach have proved necessary. It is now fairly well established that the greater part of human variation in intelligence is referable to physiological causes, and is controlled by a very great number of genes of small effect. Once we are out of the range of the idiots and imbeciles, the intelligence ratings of the rest of humanity, as has been shown notably by Fraser Roberts, conforms to the normal curve, the hump-backed curve, with its smooth peak at the mean or average, about which the greater part of the population are concentrated. There is every reason to suppose that in respect of temperamental traits, too, the same distribution holds. I would like to refer particularly to the work of Eysenck (4). Taking such a quality as suggestibility, which has frequently been connected by psychiatrists with hypnosis and hysteria, he found that when tests of this function were regarded in a naïve way, it did seem that human beings could be classified into two types, those who were and those who were not suggestible. More careful work brought out, however, that when the tests were sufficiently sensitive about the middle of the range and were not all too closely connected with an all-or-none reaction, the normal curve did indeed hold. He and I would agree in following the lead of Guilford in taking the concept of dimensions of the mind as that which is best adapted to a consideration of observational data, and not that of types.

Human beings must be held to vary, in a way which is adequately described by the normal curve, along not one but very many independent dimensions. Some of these factors which have been analysed by Eysenck and his co-workers are the general tendency to neuroticism, the disposition towards the opposite poles of an affective or a hysterical reaction, body type and body size, levels of aspiration, suggestibility, and others. And these traits, though independent, have correlations one with another. Many of them are shown to have close connections with the disposition to react to environmental stresses with neurotic symptoms. In fact differences between individuals are of a quantitative and measurable kind, and certain traits of personality are particularly associated with neurotic symptoms of one kind, others with symptoms of another kind.

We now come to a consideration of the aetiology, and here I wish to lay emphasis on the fact that I am not discussing the proximate causes of neurotic breakdown or of psychopathic reactions. These causes lie in the strains and stresses of life as we live it, and will differ for each of us. Things which to some are a strain will be a source of satisfaction and well-being to others. Their mode of operation has been extensively investigated by psychoanalysts, followers of the school of Pavlov, by neurologists, physiologists, electroencephalographers, general physicians and many others. What I am proposing to discuss is the predisposing causes of abnormal reactions—those factors which go to the building up of the individual constitution. Here once again I think we are led to draw a lesson from what is known of the causes of human variation in intelligence and mental defect. Intelligence and mental defect are obviously very closely connected with the organization of the brain, and it

is in the organization of the brain that we must seek one of the principal factors in the determination of individual traits of personality, temperament and character.

Over by far the greater part of the range, once the level of the idiot and imbecile has been left behind, variation in human intelligence is preponderantly controlled by multitudinous genes of small effect; but within the range of the idiot and imbecile other causes are prominent, and these are causes of a type which we are wont to consider pathological. There are, for instance, the single genes of large effect, of which one of the most typical is the recessive gene of phenylpyruvic amentia. If the individual possesses but one of these genes, his intelligence is not more likely to differ from that of the average than is that of any randomly chosen member of the community. If, however, he possesses a pair of these genes, it is extremely improbable that his intelligence quotient will be above 60 per cent. As analogies of these conditions we may note the occurrence of the endogenous psychoses, which have been shown to have a genetical basis, and one which probably depends on a single gene. Apart from psychotic illness, a part of the total variance in temperamental traits may be accounted for in this way. Among the near relatives of schizophrenics, psychopathic individuals have been repeatedly found who show in common certain traits of personality—those we are accustomed to call schizoid. It is not necessary to detail them, or to point out that they have not yet been sufficiently described. The picture is, of course, confused by the appearance of psychopaths of heterogeneous types, present only because of the expected incidence of abnormal personalities caused by normal human variation. The psychopaths found in excess in schizophrenic families are, however, of a very different type from the psychopaths likely to be found among the families of manic-depressives, where we see instead chronically hypomanic individuals, sufferers from a lifelong neurasthenia and mild depression, persons who swing between these poles and are never able to maintain for long an affective equipoise. In the same way we find among the relatives of epileptics, persons who, though themselves never subject to overt motor manifestations, show tendencies to mood variations of a more explosive kind, to impulsive activities, and other traits commonly seen among epileptics themselves. The psychopathies which are related to the endogenous psychoses may therefore, like the psychoses themselves, be the results of single genes.

Prominent among the cases of severe mental defect, we may find not only the effects of single genes, but also the effects of gross environmental disturbance, of birth injuries, infections of the brain and meninges, diseases of unknown but environmental aetiology such as Little's disease. These, too, have their analogues in the temperamental field. Disregarding the frank psychoses, such as general paralysis, we see profound changes in the temperamental constitution and the personality wrought by brain trauma, the so-called post-traumatic personality, known for its tendency to headaches and hypochondriasis, to neurasthenic reactions, to an explosivity of temper. The changes in personality caused by deliberate and localized destruction of brain tissue, such as prefrontal leucotomy, are well known, though still in need of much further investigation. Resemblances exist between these abnormal

traits of known organic pathology and those which arise endogenously ; manifestations of a hysterical kind are particularly well known in frontal syndromes.

It would I think be superfluous here to go into or even to mention all the possible causes of temperamental abnormalities along known organic lines. Some of them, such as alterations in the balance of the endocrine glands, are clearly of great importance but still very obscure in aetiology and mechanism. Despite the efforts of psychoanalysts and psychiatrists of psychodynamic leanings, the effects of psychological causes also remain far from well defined. It is indeed extremely difficult to disentangle them from genetical causes. If a child has a highly abnormal early upbringing, it is probably because his parents have themselves been abnormal personalities ; and in this case abnormality may have evolved in the child along either of the two paths, environmental or genetical. Methods of research exist, such as the investigation of foster-children, which could help in the disentangling, but they have serious difficulties of their own. Nevertheless we may see the effect of environmental causes of a psychological kind in influencing the development of personality at times in fairly pure culture in the clinical field. Observations of this kind were common among the traumatic neuroses of the war. After some traumatic experience the man might be left still, as far as he was aware, well enough, but with a heightened susceptibility to stimuli of a number of kinds. After a period of worry he might suffer the recurrence of nightmares ; his temper might take on an aggressive or explosive quality previously lacking ; with minor physical ailments there would be a more pronounced tendency to hypochondriasis, etc. The constitution, used in any practical sense of the term, was altered for the worse, although this alteration might itself prove to be of a temporary character.

Observations like this underline the undesirability of viewing the constitution in too static a way. There is no point in distinguishing too narrowly between, for instance, the genetical make-up and factors of an environmental kind. Genetical effects are changing constantly throughout life as genes hitherto latent begin to make their effects felt ; often they will need some specific environmental cause to be brought into the foreground. There is, for instance, a genetical basis for the tendency to delirious and confusional reactions, but it can only show itself when the particular environmental constellation of circumstances is present. The environment, too, throughout life is constantly moulding the personality and its dispositions to particular forms of reaction. At any one time we can only usefully consider what is the constitution at that time, and not what its theoretical components might be.

But when all is said, the single causes of profound modifications of the constitution and personality are unable to account for the greater part of human variation in the temperamental field. For this, as with intelligence, I believe we must go to the genes of small effect, to the total genetical make-up as the principal known source of a sufficient degree of variation. This is not only on *a priori* grounds, although I think it would be very difficult to imagine that factors of the same kind as are known to produce profound effects in most other branches of physiology, in stature and in intellect, could be completely ruled out when we came to the emotional field. We have a considerable body

of direct evidence that the total genetic make-up is of great significance for personality. This evidence is of course derived from familial relationships, and related to two aspects, which we may call those of specificity and non-specificity. On the first aspect we have striking evidence from the study of uni-ovular twins. The work of Lange, Kranz and Stumpfl on criminal twins has shown very clearly that the basic framework of the personality exhibits a very high level of similarity in uniovular twins, although the twins in their social relations may show superficial differences. The alteration of views that occurred with time is of interest here. Lange was inclined to think that heredity alone could account for criminal behaviour, and he spoke of "crime as destiny." A much less rigid view was reached by Kranz. Careful inquiry showed the significance of environmental and psychological factors, like family traditions, in determining such overt reactions as criminality. But even where there were differences in social behaviour, these were manifestations of similar personalities reacting differently to different environments; the personalities themselves were very much the same in all traits to which a psychiatrist could give a name. So it seems that the contribution made by heredity to the development of character is very important; but evidence from twins tells us nothing about the nature of the genetical equipment involved, and whether it is dependent on one or many genes.

However, evidence of a different kind shows that we are not here concerned with the operation of single genes of large effect. It has so far proved impossible to discover discriminant factors which will separate cleanly from one another the hysterical and the non-hysterical, the anxious and the phlegmatic, the obsessional and the unobsessional. Wherever we approach the issue we find normal distributions and differences in degree. Furthermore there is the factor of non-specificity. When the relatives of neurotics or psychopaths of any particular kind are investigated, we find not only an excess of personalities with abnormal reactions of an exactly similar kind, but also an excess of those showing abnormal reactions of different, although to some degree related kinds. The work of Brown (5) in this field is particularly striking. I believe the evidence is already strong enough to allow us, while accepting the importance of heredity, to reject the single gene hypothesis and to adopt that of multifactorial inheritance.

It is now too late to consider in detail the consequences of this view. It leads us, I believe, to a more comprehensive and more balanced view of the problems of neurosis and psychopathy than we have at present. Above all, it does not lead us to a static view of the personality, where all is regarded as rigidly set and beyond the possibility of exterior modification. As far as treatment is concerned, while a realistic caution is imposed, fields already found promising of therapy along both physical and psychological lines are left open to exploration.

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THE MODERN APPROACH TO JUVENILE DELINQUENCY : OBSERVATION CENTRES.*

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I. THE JUVENILE COURT AND THE PSYCHIATRIST.

Once it has been established that a child has, in fact, committed the offence with which he has been charged, the interest of a present-day juvenile court is centred not so much on the nature of the offence itself as on the nature of the child and of the influences which may have contributed to the unconventional or antisocial attitude of which his offence may be the outward and visible sign.

This interest in the natural history of the offence and of the offender is the result of a change of outlook toward the social problem of juvenile delinquency which has been taking place gradually in this country since the end of the last century. Children under 14 are no longer sent to adult gaols, and young persons under 17 only in exceptional circumstances. By stages, of which the Children's Act of 1908 and the Children and Young Persons Act of 1933 are the important milestones (1), the attitude of the law towards young offenders has undergone radical change.

The courts now recognize that there is a process of development by which the child attains an adult sense of responsibility, and that this process may be far from uniform in different children as judged by its effects on their behaviour, while yet ending in a satisfactory attitude to society. While punishment has to remain among the means of dealing with an offender, the more enlightened courts now regard it as a poor substitute for removal of the causes of his social inadequacy. In establishing the method of remanding children pending an investigation of their circumstances once the facts have been ascertained, the courts have adopted a procedure which allows of a scientific approach to the problem. It is not surprising, therefore, that they have turned, in investigating the mental attitudes and the behaviour of the children who come before them, to those whose aim it is to apply the methods of science to problems of mind and of human behaviour in general.

Long before juvenile courts achieved legal recognition in this country, magistrates were well aware from their daily experience that juvenile delinquency was associated with poverty and neglect, with bad example or the lack of any example at all, with broken homes and lack of outlet for normal childhood energy. While many of these factors could only be dealt with by major social reforms, it was realized that their effects could be to some extent neutralized if better influences were brought to bear soon enough. Some

* A paper read to the Northern and Midland Division of the Royal Medico-Psychological Association on 27 September, 1947.

children, on the other hand, on account of mental defect or disturbance or of physical ill-health or deformity, were more prone to get into trouble even when living in reasonably good circumstances. Those who were responsible for the Children's Charter of 1908 realized, in fact, the need for a systematic examination of the problem, for a scientific as well as a purely legal approach.

The response to this appeal for scientific method was seen in the series of surveys carried out in this country and in the United States, where juvenile courts are a considerably older institution. In the period up to 1930 surveys of this kind demonstrated that the technical worker could assist the magistrate in a number of ways. Those of Healy and Bronner in Boston (2) and of Burt in London (3) were outstanding in this respect, while the work of Goddard (4) demonstrated the importance of intellectual retardation as a factor in delinquency. By 1925 magistrates were beginning to accept the fact that a very large proportion of the children who came before them were constitutionally within normal limits, and that with relatively simple adjustment of their environment they could be expected to improve their attitude toward society. The writings of Clarke Hall (5), based on his experience at the Shoreditch Juvenile Court, had a great influence in bringing to this point of view magistrates who had previously viewed with suspicion any movement toward leniency in dealing with criminal tendencies in the young. It had by now been shown that in almost all cases a painstaking investigation would reveal circumstances which had favoured a delinquent attitude in the child. The offence might be the resultant of a variety of interacting factors. Ascertainment of those factors might point the way to treatment, and give the court the guidance they needed.

The next stage in the evolution of the present attitude of the courts arose out of the increasing interest in psychopathology which came with growth of the psycho-analytic schools and the application of the theory of the unconscious to other fields of human behaviour than the psychoneuroses. Attempts were made to apply psychopathological theory to the delinquent child, and to discover the intermediate mechanisms by which an unfavourable environment might produce antisocial conduct. Although at first there was a tendency to strain the facts of experience into a psychoanalytic mould and to underestimate the more obvious environmental factors, it was possible to demonstrate that delinquency was not uncommonly a symptom or a result of emotional disturbance, and that in certain cases psychotherapeutic methods might make a contribution to treatment.

This work was of great importance because it presented the delinquent objectively as an individual who, for reasons of nature or nurture, was unable to adapt himself to life in an organized society. The psychometric workers had already shown that there was a group of children whose constitutional handicap was so great that they had little chance of improving unless provision was made for their education in special schools or for their care in institutions, and that the presence of these children hindered the progress of others in the courts, on probation and in the approved schools.

The magistrates had thus to recognize that each case might set a difficult and involved problem, and that exceptions were likely to be encountered to

any rules which they might make for themselves for the handling of even clearly definable types of case. It is not to be wondered at that those among them who were unable or unwilling to make the mental effort of understanding the human motives of the children brought before them, were only too glad to pass on the problem to anyone who claimed to be able to understand and to cure. The distrust with which psychiatrists are still regarded by some justices at the present time is to some extent the legacy of those who promised too much but showed so little contact with reality when asked to help the courts. That some magistrates transferred their faith to other systems is not surprising.

The more progressive magistrates, however, faced the fact that detailed investigation was necessary in a considerable proportion of cases, and in the Act of 1933 secured a framework in which it could be carried out. They realized the need for technical assistance. Many of them also saw that such assistance must have limitations until there was both an increase in knowledge and an adequate supply of psychiatrists and psychologists with experience and training in working with the juvenile courts. In a number of areas magistrate and psychiatrist have now worked together for some years, each gaining a knowledge of the other's province and his limitations. From such co-operation has emerged the present feeling that the system of investigation of delinquents can still be improved, firstly in order to inquire into the causes of the behaviour of each child at the earliest possible period in his life-history, and secondly to further the scientific investigation of the problem as a whole, so that techniques can be improved by constant criticism. The need for further evolution on these lines was emphasized by Lord Caldecote, Lord Chief Justice, who in 1942, referring to juvenile courts, wrote that "given the proper organization, it can hardly be doubted that the Act of 1933 can be made a much more effective instrument . . . than has so far been found possible" (6).

Since 1933 very great strides have been made in the organization of juvenile courts, and the co-ordination of the agencies which can contribute to their investigations and carry out their recommendations. Magistrates who have specialized in this work for many years and who have pooled their experiences are seeking constantly to improve their organization and technique, and their efforts have had the effect of gradually raising standards throughout the country.

The co-operation of magistrate and psychiatrist which now prevails in a number of areas was not developed without friction. The wide variation in practice between courts, as shown by the proportion of cases birched, fined, sent to approved schools, put on probation or discharged, was and to some extent still is an indication that there is as yet no sure and established treatment, and that those with bigoted views on the value of this or that system can apply their principles unchecked by the salutary disclosures which result from follow-up investigation. If psychiatrists have found much to criticize in this state of affairs, the attitude of those in their ranks who approached the work with the equally bigoted assumption that psychopathological theory based on work in entirely different fields of psychiatry could be applied unmodified to the

delinquent child caused an equal discontent in the magistrates. Furthermore, in his contacts with the courts the psychiatrist, and especially the psychiatrist whose main background is in psychotherapy, has had to modify his fundamental attitude to his patient. In the earlier days of psychiatric examinations for the courts there was a tendency for psychiatrists always to report on their patients as if they had been called upon to give evidence for the defence, and to explain away what the child had done in an unfamiliar terminology. They were regarding the child as their patient, and had not adjusted themselves to their new role of providing objective evidence for the court's use, having regard not only to the needs of the patient, but of society as well. A similar state of affairs was seen in the army during the war, when a number of psychotherapists became army psychiatrists. Until they had re-oriented themselves and realized that their efforts were in the interests of the war effort as a whole, as well as of the individuals they were called upon to examine, psychiatry tended to be regarded as a new way of evading justice at courts-martial, or a new route through which men could get out of combatant duties or out of the service altogether. When later the army psychiatrist became the expert adviser to the court-martial, rather than the prisoner's friend, he had acquired an attitude comparable to that needed in advising a juvenile court. When they come to work with juvenile courts, as one hopes they will, these men will already have acquired this most necessary quality of objectivity, and the respect for the rules of evidence which goes with it. If he is to earn the respect of the courts, the psychiatrist must have a realistic conception of the circumstances to which the child is trying to adapt itself. He must acquire a knowledge of the background of his cases, and of the type of environment in which delinquency flourishes. He must see the problem as a social as well as an individual one.

In spite of the initial misunderstandings due to these and other causes, magistrate and psychiatrist have now in many areas profited by their own and each other's mistakes and, with a full realization that there is yet much to learn, have evolved a combination of British justice, scientific method and common sense with a leavening of sentiment which has allowed them not only to understand their cases better, but to pave the way for a better understanding of the problem as a whole.

The view has been expressed by a number of very experienced magistrates (7) that a psychiatric examination should be carried out on every child once his offence has been proved. At many courts in the United States every child is so examined even before this stage. This would not be possible at the moment in this country owing to the lack of psychiatrists with sufficient training. It is possible, however, that some sort of screening examination of every case placed on remand may provide a solution to this problem.

It is well to remember that the relationship between the psychiatrist and the court in this country differs from that in many other countries, notably the Scandinavian countries and the U.S.A. (8). In the former the court does not exist as a tribunal at which the child must be tried, and it is not necessary to establish guilt if it can be shown that there are other circumstances which make it advisable for the court to direct that social measures or special training

shall be carried out. In Norway and Sweden the court is entirely replaced by a council, resembling a child guidance conference, on which are represented all the agencies concerned with the child (9). In the United States the juvenile court is not a criminal but a chancery court where the State may, if it is considered necessary, assume the duties of a parent when no one else is able or willing adequately to do so.

In this country, where the tradition of impartiality and fair trial is so strong, the psychiatrist stands in relation of adviser to the court. In a certain proportion of the cases he is able to examine the evidence in the light of his experience, and in his report confidently to recommend some course of action. If he is a man of experience in this work and is known to the Court his recommendations are almost invariably acted upon. He may feel that in effect he is deciding the disposal of the child, and may wonder if the complicated machinery of the court could be replaced by an organization more like his own clinic. This is particularly the case when, in the relatively rare instances where the psychiatrist has greater experience than the magistrate, his recommendations are upset because the latter holds views about children which have not yet been tempered by experience. The adaptation of the system of trial to the needs of the child should be assured by the provision in the Lord Chancellor's Rules, in which it is laid down that juvenile court magistrates must be specifically qualified to deal with juvenile cases, but it is now essential that the number of such specially qualified magistrates should be increased. The problem of training adequate numbers of either magistrates or psychiatrists has not yet been solved.

The child is a young citizen, and has the right to expect the same fair trial as is given to his elders. He has the right to refuse special examinations until they are prescribed for him after the charge has been proved. The system as practised at present is scrupulously fair. When one attends some of the juvenile courts, however, and sees the very large number of officials and the multitude of people involved, one wonders whether a little of the expenditure devoted to the dignity of the Court might not be sacrificed in the interests of fuller investigation of the child.

II. THE BACKGROUND OF DELINQUENCY AND THE PSYCHIATRIST'S CONTRIBUTION.

Although it is not possible here to discuss in full the factors of which the interplay may determine delinquent behaviour, it is necessary to review the principal causes in order to show where the psychiatrist can contribute to the investigation and treatment of any given case.

Just as a child under investigation must be considered as a unit of humanity with its constitutional assets and liabilities, trends and vulnerabilities in process of being moulded by the environment it encounters, so it is expedient to consider the factors making for delinquency as divisible into constitutional and acquired, bearing in mind always that in no case are all the factors unfavourable to social adaptation either one or the other.

TABLE I.

Constitutional.

1. *Mental defect* : Inability to acquire knowledge at the normal rate leading to compensatory mechanisms and inability to adapt as an average member of society.
2. *Psychopathic inferiority* : Inability to keep in step with the group, or to feel or make judgments like an average member of society.
3. *Moral defect* : Inability to acquire any outlook beyond an egocentric one—frequently combined with distorted emotional and hedonic impulse.
4. *Psychosis* : Functional or organic distortion of mental processes, with secondary alterations in attitude to other individuals and to society in general.
5. *Disorder of central nervous system* : Including those predisposing to social inadequacy, episodic impulsiveness, character change and neurotic mental mechanisms.
6. *Physical inferiority* : Disorders of sensation and locomotion preventing normal communication with the group. Metabolic and glandular disorders affecting psychological attitude. Deformities and inferiorities necessitating compensatory psychological mechanisms.

Environmental.

1. Lack of proper nutrition and care, education and example.
2. Deprivation of normal emotional ties.
3. Lack of outlet for ambition, interests and energies. Effects of frequent change of environment.
4. Psychological consequences of constitutional differences from the average.
5. Delinquency as a manifestation of psychoneurosis of whatever causation.
6. Uncertainty as to future, especially of emotional relationships.
7. Positive influences, such as cruelty, or tuition in crime.
8. Effects of misunderstanding of previous delinquency.

Where constitutional factors heavily outweigh the effect of circumstances, little can be done to alter the underlying defect, and the object must then be to ascertain its presence and to manipulate the child's environment so that he can do a minimum of harm to himself and to others. He must be afforded the optimum chance of becoming as contented and productive as his handicaps allow.

It is now many years since the relationship of mental retardation and defect to delinquency was first recognized, and court officials are always on the look-out for members of this numerically important group. If an adequate examination is carried out they can always be detected, though to advise on the subsequent management of some types may require much knowledge and experience. Many backward children are found to be so for the first time as the result of being brought before a juvenile court. The efficiency with which they are detected at present varies, and there is no doubt that in some areas not only are they recognized for what they are only after several appearances in court, but that children and young persons are sent to approved schools who are eligible for certification under the Mental Deficiency Acts (10, 11).

The need for expert assistance in this field is now recognized by all courts, but the fact that the actual testing can be carried out by a psychologist or a trained lay person has led to the belief among some court and local authority officials that the Intelligence Quotient so obtained is a sufficient guide to the

disposal of a case without the further opinion of a psychiatrist. This is a dangerous belief, especially where it leads to amateur efforts at testing or to the placing of excessive reliance upon group tests. While it is not necessary for a psychiatrist to carry out the tests, the psychiatric examination of the child in the light of the results obtained is essential. Many backward children are stable and their potentialities as good citizens are great, while in others the degree of insufficiency is far greater in the social than in the intellectual field. We have as yet no satisfactory quantitative tests of social adaptability (12), and it must be assessed by the examination of the child in the light of his past history of successes and failures. Only on the result of such an assessment and its relation to his intelligence and temperamental qualities can a sound opinion be given as to placement.

In the field of constitutional psychopathic inferiority, with or without abnormality in the nervous system and in the more serious forms amounting to moral defect, it is likely that the psychiatrist will be able to make an increasing contribution as our knowledge of the subject increases. It is to be recalled that the juvenile court, dealing as it does for the most part with the children of a depressed class, acts as a filter which tends to separate off the inferior members of a constitutionally inferior group where inherited influences have played a large part in placing its members in the unsatisfactory environment which has conduced to their antisocial behaviour. It has long been known, for instance, that minor abnormalities of the central nervous system are more frequent in the children examined in remand homes (13) than in normal school children. In the same way it can only be expected that inherited tendencies to psychopathy of one kind or another will be more frequent, and that a greater proportion may be expected to become psychopathic or prepsychotic personalities when they reach adolescence and maturity. Recognition of such constitutional vulnerabilities is essential to the planning of realistic training and treatment. The ability to assess clinically this part of the child's personality comes only with much experience, but when acquired, it can be of the greatest value to the courts.

The group of moral defectives and of grossly psychopathic personalities is small, but of the greatest importance. Cases of this kind when not recognized for what they are can rarely find a satisfactory place in the administrative framework and are the cause of much embarrassment. They set a bad example in schools and training centres and retard the progress of other children. Since the nature of their disorder is unknown to laymen, differences of opinion as to its causation and correct management frequently arise. These children very often become test cases in minor disputes, and since many of them are of above average intelligence, they are able to take pleasure in fomenting discord. When everything else has been tried, the psychiatrist is often expected to find an answer for problems of this kind. It is extremely difficult to provide for the less severe cases of this sort, and even in the case of moral defectives there is great reluctance on the part of the medical officers of local authorities to co-operate in using the facilities provided by the Mental Deficiency Act unless the child shows a considerable degree of intellectual defect as well.

The presence of severe constitutional defects in a proportion of the cases

seen need not lead to a fatalistic view of delinquency in general, nor a return to the view that the criminal is born and not made. Indeed such a view could not stand up to the obvious fact that the vast majority of children appearing before the courts eventually make a satisfactory adjustment to life. The follow-up results of all groups, whether first offenders, probationers, pupils at approved schools or trainees at Borstal, show that a minority appear at the courts again. There is a general tendency in the young to conform, which can express itself in spite of the most adverse conditions.

In seeking to give the maximum assistance to the child in his struggle to achieve a normal adaptation, the first and the safest contribution we can make is to remove difficulties from his path which prevent him from having as good an opportunity as other children. The reports of social workers and probation officers contain objective evidence of such factors as cruelty, underfeeding, lack of recreational outlet, poor school attendance, bad companions, poor housing conditions, inadequate sleep, friction between parents, or desertion. It is clear that to remove these adverse factors will do nothing but good, provided that the method of removal does not create problems of its own. Important as this work is, forming as it does the mainstay of the probation officer's approach, its value is limited unless an insight is gained into how these factors are involved in the child's difficulty. This is particularly necessary when empirical social measures do not produce the expected result.

TABLE II.—*Factors Which Can be Influenced by Social Measures.*

Alterable or modifiable.

Unsuitable school or work.
Lack of companions or recreational facilities.
Overcrowding. Neglect and indifference.
Bad companions. Discord with siblings.
Cruelty. Encouragement in crime.
Temptations. Unsuitable recreations in district.
Discord between parents. Overstrictness.
Psychoneurotic parents.

Effects which can be minimized but are not alterable.

Mentally defective, psychotic, drunken, psychopathic or unemployable parents.
Step-relationships. Illegitimacy.
Desertion by or separation of parents.

A more effective approach is to establish the presence of, and to try to eliminate, such factors as a feeling of unwantedness, a sense of inferiority, a resentment of injustice, a desire for revenge, a frustrated ambition, a disturbed sibling relationship, a desire to escape, perplexity as to what is right, a desire to emulate or outdo some other child or a resentment of ridicule. Feelings and impulses such as these may be largely the result of an abnormal social background and may be dealt with by purely social measures. If, however, the intermediate emotional factor is not considered, a drastic social measure, such as removal from home, may do emotional harm while doing material good. It is for this reason that the psychiatrist can by patient and methodical investigation help to provide a basis for the social treatment which is prescribed in the decision of the court.

In particular, the psychiatrist can, by assembling the available information, see the child as an individual. He is able to realize how numerous are the possible reasons for the child's behaviour, and by what a variety of mental mechanisms the same social conditions may give rise to the same act of delinquency.

TABLE III.—*Possibilities of Disposal of a Child or Young Person Found to Have Committed an Offence.*

Judicial measures:

Police caution.

Dismissal.

Bound over—without recognizances.
—with recognizances.

Fined.

Ordered to make restitution.

Birched.

Put on probation—Without condition of residence.

With condition of residence (hostel, boarding out).

„ recommendation as to recreation.

„ „ „ psychological treatment.

„ „ „ periodic psychological examination.

Remanded in custody for further investigation.

„ on bail.

Case adjourned *sine die*.

Approved school—Short term.

Classifying.

Normal.

Committed to Sessions. Borstal.

Remanded to prison.

Committed to care of Local Authority—for residential school.
for foster home.

Recommended for—Treatment in hospital.

Convalescent home.

Open-air school.

School for physically handicapped children.

Attendance at out-patient clinic.

Certified as mentally defective and recommended for—Hospital.

Training colony.

Statutory supervision.

Certified as morally defective.

Recommended for farm training school.

Deemed educationally subnormal and recommended for—

Class for educationally subnormal pupils.

Special school (resident).

Special school (day).

Deemed maladjusted and recommended for—

School for maladjusted pupils.

Hostel for maladjusted children.

Recommended for private hospital or school for treatment.

„ „ epileptic colony.

„ „ Colony for post-encephalitic cases.

From the moment the hand of the law is on his shoulder and throughout his contact with the court and its apparatus, the child is going through a profoundly impressive experience. Many things which are said to him will be remembered, and attitudes taken towards him may have lasting effects. In the course of building up his dossier and of asking him about himself, oppor-

tunities occur of answering questions, correcting misapprehensions and giving him much-needed reassurance. These opportunities are far more valuable than any which can be created at a psychotherapeutic interview. There is, in fact, a need for psychiatric first-aid in the early stages which may reduce the need for more deliberate psychological repair later. It is very important that the psychiatrist should be at hand not only to give aid himself, but to instruct his team to take such opportunities when they arise.

In a certain number of cases the emotional disturbance within the child may be such that there is little hope of a normal attitude to life without psychotherapy. Except for the first-aid mentioned already and for what might be called psychiatric probation, the number requiring deeper psychotherapy cannot be large. There is a tendency for psychotherapists examining delinquents to underestimate the readiness with which a child responds to a favourable change of circumstances. None the less, such cases occur not infrequently, and it is important that if psychotherapy is required it be commenced at once, in order to profit by the relationship established at the interview. In general, therefore, the contribution of the psychiatrist to the work of a court is to apply scientific method to the assessment of the child's condition and its relation to his behaviour, to inform the court in simple terms of what he has found, and to make any necessary recommendations regarding the amelioration of social conditions and physical or psychological treatment.

III. THE PRESENT STATE OF OUR KNOWLEDGE.

The investigations upon which our present knowledge is based (2, 3, 4, II, 12) have been carried out, for the most part, on groups of delinquents, and have dealt with such problems as the effect of different kinds of treatment or punishment, the intelligence and physique of delinquents, their family histories, their psychopathology, and the incidence of different forms of delinquency in geographical or social groupings in the community. As a result of this work the general nature of the clinical material has become clear, but the figures available are in the main suggestive rather than conclusive. The time has now come to plan the next steps in this country so that further and more exact knowledge can be acquired.

It must be borne in mind that the effects of the forces which have led to delinquent behaviour in childhood are likely to be felt throughout the individual's life, and the final outcome of the conflict in him between antisocial behaviour and good citizenship can only be known as his subsequent life-history unfolds. Nothing, therefore, short of a very thorough investigation with a detailed follow-up of his subsequent career can tell us whether he has become a useful member of the community, or whether he has merely learned to subvert the social order in some way which does not conflict openly with the law. Only in such a way can we find out what proportion of our juvenile delinquents will later show neurotic breakdown, gross psychopathy, psychosis or recidivism, and how these trends can be recognized and possibly prevented at the earliest moment. Quite apart from the group approach, there is still much to be learned on the clinical side from the study of individual children.

There are now a number of recognized syndromes in which an established set of causes has brought about an effect, but the number of psychiatrists working on this type of problem has been relatively small in this country, and the work of each only becomes of value when he has acquired experience.

A considerable body of figures has now accumulated from a variety of sources, but it is extraordinarily difficult to draw any but the most obvious conclusions from them. This applies particularly to figures relating to the results of different methods of treatment and disposal. Up to the present attempts to assess results have had to be based very largely on the proportion of cases which do not appear before the courts in a given period of time—say five years—and even five-year follow-up results are not numerous. In normal times, for instance, before the complications of war and evacuation were added, it could be expected that about 70 per cent. of cases bound over or discharged did not get into trouble again within three years (5), 67 per cent. of children and young persons put on probation were not charged again within three years, and over 70 per cent of boys sent to approved schools were not charged again within the same period (16). These figures tell us no more than that about 70 per cent. of cases seen by the juvenile courts are not caught again within three years—whatever is done to them. These results are consonant with the fact that the incidence of offences in general decreases with age. Of every thousand boys aged thirteen, 13.5 are found guilty of offences in the course of a year, by sixteen the figure has dropped to 10, and by nineteen to 6.8 (14). There is thus a tendency, as the individual passes through childhood and adolescence, and finally settles down to middle age, for those whose social maturation has been delayed gradually to conform to the codes of the group. This gratifying fact has led to much confusion in the interpretation of statistics relating to the treatment of juvenile delinquents.

Our objective is to improve the attitude to society of juvenile offenders and to make them into better citizens. We have also to prevent the juvenile offender from developing into the habitual adult criminal. These two objectives are not necessarily identical. Some juvenile offenders are constitutionally incapable of becoming normal citizens, and must be protected, specially trained or segregated if they are to avoid recidivism. The mental defectives, the physically handicapped, the moral defectives are members of this group, as are the grosser psychopathic delinquents. It must be an important part of future research to define as accurately as possible the extent of this group, who show a serious constitutional defect in social adaptation, and to plan for them a life in which they will be able to contribute as much as possible to the community and to do a minimum of harm by their behaviour and their example.

Surveys of adult criminals carried out so far indicate that a relatively small proportion of recidivists show gross evidence of an initial constitutional handicap (18). We are thus able to conclude that the criminal attitude of the majority might have been prevented if circumstances had not irrevocably moulded their attitude to society for the worse. If we are to help them, however, we must first understand the relationship between juvenile and adult criminal behaviour.

Among adult habitual offenders 70 per cent. have made their first appear-

ance before the courts before the age of twenty (19). This figure has to be considered in the light of the fact that roughly an equal number of offences are committed by individuals of over and of under twenty-one, but it none the less indicates that the recidivists of the future are appearing in the juvenile courts to-day. We are still unable to detect with certainty those in the greatest danger, and the results at our disposal, confused as they are by the fact that most children recover anyway, give us no certain indication as to the best way of detecting them and diverting their energies into better channels.

Of the methods of treatment, that which is best studied and documented is one in which psychiatrists have played no part at all, namely, Borstal training. The reports of the Borstal Association show that over a five-year follow-up the percentage of the group who were doing well after release is in almost direct ratio to their age when first sent for Borstal training, over 80 per cent. of those committed under eighteen proving successful, as against little over 60 per cent. of those committed at the age of twenty (20). The results of approved school training in the lower age-groups show the same tendency (16). This leads us to the expected conclusion that training of this kind is more likely to be successful if it is begun early.

The general impression which emerges is that among the children who appear before the juvenile courts there are three groups which merge into one another. Firstly, a very large group in whom the offence has been merely an incident in the process of acquiring an adult sense of responsibility, who can be expected to recover in any case, and whose recovery may be helped by the adjustment of any environmental stresses which come to light as the result of the court's investigation. Secondly, a group whose delinquency is the symptom of a disturbed attitude to society due to adverse environmental conditions or to gross emotional stress, whose recovery requires active measures, social, educational or psychotherapeutic. The third group are the children with severe constitutional handicaps, and the figures available suggest that those whose handicap is one of inability for social adaptation may form a hard core of potential criminals for whom at present relatively little can be done. In the interests of the much greater number of hopeful cases whom they are able to corrupt, we must face the existence of this group of delinquent psychopaths. The work of Henderson (21) has drawn attention to the importance of this group among adults, and from it we see that the psychopathic tendency has usually been manifest, and therefore presumably recognizable, from early life. Yet there is a tendency on the part of those working with juvenile delinquents to minimize the importance of this group. One of our tasks in the future is to learn to recognize early these cases of poor prognosis and to consider, if they really are doomed to psychopathy, whether special legislation should eventually be provided to prevent them from leading others astray by having them live in communities of their own.

Fortunately it is with the more hopeful cases that we are likely to be more frequently concerned. We have to discover safe means of supplementing the natural tendency to recovery in the same way as a physician does in the absence of specific treatment. In some cases specific social or psychotherapeutic treatment may be possible, but the first principle of all treatment,

"*prima non nocere*," must be constantly borne in mind. In seeking to do good we must avoid doing harm.

The framework for investigation of the problem already exists if its parts can be linked up. At certain remand homes where psychiatrists have been employed, valuable records have been kept during the past few years, but in other areas such records are of an impersonal character, and are difficult of access in the files of courts, education authorities and probation officers. The records of the future must be planned so that they can have real meaning, and their keeping might be a legitimate function of any centre designed for the investigation and observation of delinquents.

In a number of areas the representatives of the different agencies concerned with delinquent children have, by working together with a common object, formed a team within which the work has been divided up. Such work has usually centred round a remand home. In 1927 the Departmental Committee on the Treatment of Young Offenders (10) recommended the establishment of observation centres, apart from the remand homes, at which children could be studied for a period of time. The Institute for the Scientific Treatment of Delinquency (22) has pressed for closer co-operation between social agencies and the establishment of observation centres and clinics. It might be that the functions of detailed investigation, emergency treatment, contact between agencies, voluntary and otherwise, and the training of personnel could be organized in connection with centres of this kind without seriously disturbing the present structures of the juvenile courts and their work.

A number of different groups have found that they can contribute. The organizers of boys' clubs, for instance, realize that they are able to divert potential delinquents to socially healthier interests. Those who have worked in approved schools have developed their own technique of training and have become confident of its value. The psychotherapist's experience with favourable cases has allowed him to feel that he has a large contribution to make, as has the probation officer and social worker. Magistrates have advocated techniques of their own, such as short-term punitive detention (23), but each group has tended to apply their rule to all or nearly all the cases they have seen. The psychiatrist, if he has a thorough knowledge of the subject and knows the possibilities and limitations of each method, is perhaps in the best position, if he is allowed the time and facilities to investigate each case, to make a *diagnosis*, and to assist the court in deciding which of the available techniques is, in the light of our present knowledge, the most suitable for the child. And if he is to do his work scientifically he must follow up his cases and learn by his mistakes.

IV. CLASSIFICATION AND OBSERVATION.

The writer has recently had the opportunity of studying the problems of psychiatric examination of juvenile delinquents in an area where considerable progress has already been made in the application of psychological medicine to the problems of the courts. In this area a very experienced group of magistrates are anxious to see the best use made of the many specialists and social workers who might be available to help them.

The object of this study was to explore the possibilities of modifying methods already in use, and to estimate what personnel would be required to carry out the work to an adequate standard. A temporary team was formed for the intensive examination of the cases passing through the remand homes during that period, and contact was made with all the agencies concerned in order to have their opinion as to possible improvements. Such contacts included magistrates, Home Office and juvenile court officials, psychiatrists, social workers, psychologists, probation officers, police officers, schoolmasters, remand home staff, school medical officers, mental deficiency authorities, the staffs of approved schools, and a variety of voluntary agencies concerned with the care of children. The conclusion was reached that the greater part of the children coming before the juvenile courts can benefit from a planned investigation of their cases, and that any treatment found to be necessary should be carried out at the earliest possible moment. A very large proportion of the cases can benefit from psychiatric survey, and of these a considerable number require observation under resident conditions if a satisfactory assessment is to be made.

If it is not possible, as at present, to investigate every child brought before the court, great reliance has to be placed on the magistrate's judgment in selecting cases for observation. In order to gain an idea of the efficiency of this method of selection, a series of cases referred by magistrates for psychiatric examination was compared (24) with a series of similar size of children remanded but not referred to the psychiatrist. There was little difference between the two groups, and the non-referred group contained a number of cases in need of careful assessment. In view of this finding it would appear that some other method of selection of cases should be employed, or that the magistrates should have the assistance of some sort of screening procedure in deciding which cases to refer. If, for instance, all children who were found by the courts to have committed the offences with which they were charged could be sent for a single day to a centre for group-testing and to eat and play under skilled observation, it might be a valuable addition to the material upon which the magistrate must at present base his judgment. One of the factors which often makes his task more difficult is the inadequacy of reports from schools.

Remand homes as we know them at present have many disadvantages as observation centres. If children remanded on bail are to be examined and if parents and siblings are to be encouraged to come up for interview, it may be necessary to establish special units or centres, unconnected with the remand homes, where the work can be carried out. Such centres would necessarily have a close relationship with the remand homes, and would, in fact, have to accommodate children on remand. It is, however, of the first importance that cases under observation should not come into contact with those awaiting transfer to approved schools, or undergoing punitive detention in the remand home. Novitiates in crime must be protected, at this stage at least, from the sophisticates who have to be held in custody while awaiting disposal. This factor is of particular importance in the case of girls.

The establishment of efficient observation centres is the logical next step in the scientific understanding of juvenile delinquents, and an extension of

their scope to include follow-up work, teaching and research would provide a framework within which a far higher standard of service could be given to the courts than is at present possible. Observation centres are not a novelty and centres of this kind already exist, particularly in the U.S.A., but they are for the most part due to the efforts of isolated foundations and universities. The establishment of such a centre as part of a local or regional service would mark a considerable advance, owing to the greater ease with which the different social agencies could be co-ordinated. In brief, the functions of such centres, each of which could serve a large area of population, would be as follows :

1. To collect in one place all the available information about the child. Liaison with social agencies concerned in the case. Provision of opportunities to discuss cases. Interviewing parents and contacts both in their homes and at the centre.

2. Medical and psychiatric examinations under conditions allowing of thoroughness. Observation of children under school and play conditions. Psychometric testing, including vocational guidance and temperament testing.

3. Provision of a screening examination on group-test principles for children whose offence has been proved, in order to assist the courts in determining which cases are in need of psychiatric investigation. Examination of children on bail who come up to the clinic.

4. Provision of reports to the courts and to responsible persons in charge of children's training or welfare when placed by the court. Compilation of records. Carrying out of follow-up investigations.

5. Provision of "first-aid" psychological treatment. Arranging for longer term psychotherapy elsewhere or for placement in hostels for mal-adjusted children. Assistance to probation officers with their cases. Assistance generally in implementing the court's decisions and recording the results.

6. Carrying out of statutory procedures, such as ascertainment of mental defect and classification of children under the Education Acts.

7. Research into the causation of delinquency from both the individual and social standpoints. Presentation of results of follow-up work to those who decide on treatment. Assessment of results of measures carried out. Study of methods of prevention.

8. Teaching, advice and training of personnel of all kinds who are to work with juvenile delinquents in the region or area supplied by the clinic, including magistrates, psychiatrists, psychologists, social workers, probation officers and the staffs of schools and training centres.

The essential purpose of the centre, therefore, would be to acquire enough information about each child to act as a guide to his treatment in the future. This is exactly what is meant by "classification" as carried out in the new classification schools built or in the course of construction by the Home Office. The great variety of children and young persons committed to approved schools and the wide variation in their needs from the point of view of training has led the Home Office to establish these schools, of which Aycliffe (25) is the pioneer example, where the child's needs can be assessed by allowing him

to be trained for three months under the observation of an experienced staff. On the basis of their findings he can then be sent to an approved school, which can supply the needs of children in difficulties similar to his own. This system is a great improvement on placement based on such information as may appear in the child's records, or the availability of places at the time he was committed, but one ventures to think that it would never have been necessary if a more intensive effort could have been made to classify the child at a much earlier stage. It has the great disadvantage that, having just had time to settle down to life at the classification school, the child is moved to a new school to start all over again. It is probable that after thorough investigation at an observation centre enough would be known about cases for whom education and training at approved schools was considered necessary to make a definite recommendation as to the type of school at once. Not only is investigation at the earliest possible stage a matter of urgency in many children, lest the opportunity of carrying out effective treatment be lost, but on purely economic grounds it is advisable to carry out the correct treatment at once, and avoid the sequence of unsuitable disposals which too frequently mar the case-records of children who are sent to approved schools.

V. THE OBSERVATION CENTRE OF THE FUTURE.

In the course of my recent investigation it was possible to visualize many ways in which the experimental unit could have done better work had considerations of structure, time, lack of equipment and the need to train personnel not made it impossible during the six-month period. The system already in operation was a creditable attempt to interpret the letter of the Children and Young Persons Act, which had grown, by accretion rather than planning, as the result of intermittent pressure by interested social agencies. As the local authority concerned was a progressive one that had frequently led in the development of this work, the lessons to be learned from it were of great value. From the data and impression gained during the experimental period it is possible to form an idea of how an observation unit might be organized in which an adequate standard of service could economically be given without seriously altering present methods of juvenile court procedure.

An attempt will therefore be made to outline the features of such a unit and its relation to the basic administrative mechanism for the disposal of the juvenile delinquent. A list of the main social agencies interested in such a unit and with whom liaison would have to be established is given in Table IV, while some of the sources from which information about children would have to be obtained is given in Table V. It must be said at the outset that the greatest single difficulty in threading a child through the complicated legal and administrative machinery which provides for its welfare is to obtain adequate liaison between the different agencies and to reconcile their differing points of view. While the present incomplete facilities for children's welfare exist, decision about the disposal of a child may require the reconciliation of departmental interests and efficient compromise between the ideal course of action and what can practically be done. This would be less difficult if those who were con-

cerned with the child could discuss the matter together with the common object of securing the best for each case; it is extremely difficult when the matter is purely a paper transaction to some of those concerned. It should be possible to provide liaison at the practical level as part of the function of the observation centre.

The functions of the observation centre will be dealt with under the headings of *Location, Size, Structure, Organization, Personnel and Economics*.

TABLE IV.—*Agencies Concerned in the Investigation and Disposal of Remanded Children.*

- The magistrates, the court and the police.
 The Home Office and the probation service.
 The Local Authority Public Health Department.
 Local Authority Education Department.
 Local Authority Social Service or Special Officers.
 Additional agencies who might be concerned with an observation centre :
 (1) University or other body responsible for training and maintaining standards of—
 Psychiatrists.
 Teachers at approved schools (26).
 Social workers.
 Probation officers.
 Educational psychologists.
 (2) Authority concerned with training magistrates for work in Juvenile Courts.

TABLE V.—*Information Required and Its Sources.*

The offence—its background		The Court.
Police proceedings		Local authority officers.
Previous offences		Probation officer.
Personal history		Parents and contacts.
Family and social history		Social agencies, club officials.
Effect of previous measures.		
Educational history		{ School reports.
		{ Education authority files.
Behaviour under observation		{ Staff of remand home or observa-
		{ tion centre.
Medical history		{ School medical officer.
		{ Reports from hospitals and clinics.
Intelligence level		
Special aptitudes and deficiencies		
Vocational suitability		{ Psychologist.
Temperament		
Physical state and handicaps		Physician.
Psychiatric status		Psychiatrist.
Stability and attitude to circumstances		Reports from clinics.

Location.

As the provision of an observation centre does not eliminate the necessity for a remand home, and as the children will frequently have to be transferred from one to the other, the two should, if possible, not be far apart. The principal disadvantage of housing both in the same or adjacent buildings is, apart from the possibility of communication between the two groups of children, the fact that the stigma of having to come to the remand home might deter

parents from co-operating with the staff and where necessary bringing up siblings for examination. Owing to the need for visits from parents and social workers, the centre should be in the locality from which delinquents are mainly drawn and should form part of its Mental Health Scheme. It should be within easy reach of hospitals and clinics for special investigations and, if possible, of the court. Nearness to a school might allow of the use of a number of part-time teachers.

Size.

As the incidence of juvenile delinquency varies in different areas and fluctuates in any one area, it is difficult accurately to estimate the number of places required in relation to the population. Cases would for the most part need to stay only two weeks, with a minimum of one week and a maximum of three months, so that the number required is not large. It is thought that provision of 20 places per million of population would be sufficient for larger areas, although this could be greatly reduced if a greater number of children were remanded on bail and given a less complete investigation at a series of visits. It would be uneconomic to run a centre for less than 25 children, and observation would be difficult if the number were over 80. The need to segregate different types of case would lead to wastage of space, and it would not be possible to expect the places always to be filled. It is probable that a centre for 40 children, with an upper age limit of thirteen for residents, with places for 30 boys and 10 girls would be ideal from the point of view of observation.

Such a centre could deal with more children without admitting them, and could undertake the investigation of older boys and girls up to seventeen by arrangement with remand homes. Admission of this older group as inmates would add greatly to the difficulties of segregating elements who could do harm to others under observation.

Structure.

As it is necessary to segregate groups of children at night, a number of small rooms are needed capable of holding from one to three, as well as the dormitories, which in any case should not hold more than ten. Schoolrooms are needed, for older boys and girls separately and for the younger children mixed. Play facilities, both indoor and out, must be sufficient to bring out any tendencies worthy of note as well as providing adequate freedom. There would be no objection to a common dining-room entered from both sides of the building. There should be facilities for handicrafts and toys and materials which can to some extent act as test material in the hands of the teachers. A portion of the building should be unobtrusively escape-proof, although the majority of the children will need little persuasion to keep them in.

It is important that the resident portion should have a separate entrance from the offices and consulting-rooms, which should be arranged as a clinic with its own door opening on to the street. This part would comprise a registry and records room, separate rooms for physician, psychiatrists, social workers

and psychologists, a playroom for visiting children, a waiting-room and conference room. A changing room for children, with lavatories, and a room in which visiting workers can write notes and interview parents completes the non-resident side of the centre. This side should have the outward appearance of a health centre or child guidance clinic. A most important feature is the provision of enough telephones, as a great deal of work of checking information about children or making contact with voluntary agencies can be carried out by telephone, and casual calling by workers thus reduced to a practicable level.

Organization.

It is clear that the courts who are to make use of the results of observation must be in full communication with the observation centre, and that they should be represented on its committee of management. The other agencies concerned must similarly be represented. Close contact is needed with the local authority and its facilities for child welfare, its hostels and special schools, and the centre itself would be best managed by a local or regional authority. It would not appear now to be necessary for the centre to be pioneered by a voluntary organization in the first place, as the need for something of the kind is clear enough for local authorities, or the central authority in charge of all deprived children (28), to interest themselves from the outset. The committee of management could well act as a co-ordinating committee between the courts and the local authority, such as that recommended in the Vick Report on the London Remand Homes (27).

From the point of view of teaching and research and the maintenance of standards, centres of this kind should be linked with a university where the teaching of psychiatry, applied psychology and social science is undertaken. In exchange for teaching facilities the university might be expected to provide consultant staff, and to attach trainees and research workers who could contribute to the service given by the clinic. There would be no objection to the centre also being used for statutory duties by the local authority, such as the examination of mental defectives and examinations under the Education Acts, provided that these children, using the centre as a child guidance clinic, were not admitted as residents. The treatment of maladjusted children, including delinquents, could not be undertaken at the centre, but would presumably be carried out at the schools and hostels for maladjusted children provided for in the Education Act. In a region where child guidance facilities are at present poorly developed, the observation centre could be planned as part of an integrated scheme for dealing with all psychological deviations in the young. In this the closest collaboration of the school medical service and the education authority would be necessary. The building of an observation centre presupposes a fair degree of development of other child welfare services which can act upon the results of observation.

The most difficult problem, perhaps, is to decide who is to administer such a centre. There is a case for placing it in the hands of a psychiatrist, who, of all the workers concerned, has contact with the greatest number of approaches to the subject. He could not, on the other hand, satisfactorily administer

the centre as a residential school, and the best solution would probably be to have a lay superintendent for the resident care, with a psychiatrist as director of the clinical work.

Personnel.

While the number of trained workers employed and the amount of time they give will depend on the size of the centre and the number of cases attending for non-resident examination, certain specialities must be represented on the non-resident staff. For the examination of children the psychiatrist, the educational psychologist, the psychiatric social worker and those in charge of records; and for their care, observation and teaching, a superintendent, matron, housekeeper, teachers and handicraft instructors. Much of the collection of information and carrying out of the court's decisions will, as at present, fall to the probation officers and others, and much useful work can be done by trainees in the various specialities, the function of the clinic staff being to advise and co-ordinate. The teaching function of such a centre is of the first importance, as in this way the lack of trained personnel can be made up, and some idea of the aims of this work imparted to those who are engaged in social services whose contacts with juvenile delinquents are only occasional.

In many branches of children's welfare, and especially psychological welfare, workers frequently show strong emotional bias, or adhere to special views or schools of thought which render it difficult for them to approach the subject with real scientific humility. It is probable that the standards set by a university department would do much to maintain a sense of proportion among such enthusiasts, and to get the best out of their keenness to help the child in difficulties.

Economics.

Owing to the necessarily high rate of turnover, the cost of maintenance would probably approach that of a children's hospital, and it would certainly be greater than that of a remand home. When it is remembered, however, how much trouble and expense can be caused by a single child who cannot be fitted into the educational machine, and how much can be saved by finding out the right way to deal with such a child before it has upset and corrupted the others with whom it is placed, it can be seen that the service provided would be worth the expense. If it were designed as part of a general Child Health Service, the cost would not be so great.

VI. THE PREVENTIVE ASPECT.

No physician can work long with juvenile delinquents without being saddened by the thought that the unhealthy attitude to society which many of them exhibit could have been prevented, and that he alone is powerless to prevent potentially healthy children from having to pass their most impressionable years in an atmosphere of squalor and frustration. While he can examine the products of this culture medium and sometimes attempt to transplant them to a more suitable one, he can do little to alter the medium itself

in which indifferent heredities breed in a milieu of suffocating discontent. The group from which the overwhelming majority of juvenile delinquents come is, like the unemployables and the problem-families, the portal of entry to a great social problem. A study of this depressed section of the community, who are unable for a variety of reasons to achieve the degree of social adaptation necessary for present-day civilized life, is inseparable from the study of delinquency.

Furthermore, juvenile delinquency may be regarded to some extent as a barometer of national and of local morale and cohesion. Delinquency increases with war, when civilization regresses, and it becomes out of hand in conditions such as obtain in Germany to-day, when confidence in the social order is at its lowest, and necessity drives parents to orient their lives only toward the immediate future. In the child it may be a symptom of a troubled mind. In the community, the district or the social group it is the symptom of inability to develop a social sense. In the examination of problems such as these by social survey methods an observation centre for delinquents could make a valuable contribution.

It is not enough to examine the individual delinquent whose conduct has caused him to merit the attention of the juvenile court. If we are to prevent his younger brother from appearing next year we must seek him out now. Even now one sees children who have tried hard to get help—have run away and given themselves up at police stations, have committed offences in the hope of being taken away from their homes. Cases such as this draw our attention forcibly to the hardships suffered by the underprivileged child at home, as have the findings of the Care of Children Committee (28) to the conditions under which the deprived child may have to live. Since the public conscience was first awakened to this problem much has been done, but there is much still to do, and the combination of sympathy with scientific method which the psychiatrist can bring to the problem must surely play an important part.

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THE SIGNIFICANCE OF THE HOME FOR THE CHILD'S EMOTIONAL DEVELOPMENT DURING THE FIRST SIX YEARS.*

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I DO not think that anyone, professional or layman, will contradict the statement that the family unit is, at least in our culture, the best medium for the growing child. Yet, although there is tacit recognition of this fact, it is only in recent years that more attention is being paid to providing for children, who in infancy are left without parents, with this most suitable environment for their development. In this and other countries there are still vast institutions, insufficiently staffed, entrusted with the task of bringing up hundreds of children who, we know, will become unsatisfactory citizens.

One of the reasons why this state of affairs still exists is that until recently no scientific proof has been advanced to disclose the damaging nature of an early upbringing away from the family unit. It may, therefore, seem justifiable to put forward the theories and facts that show that the family unit is the best medium for a satisfactory emotional and character development, as a scientific background to the Curtis Report, which came to this conclusion on the basis of empirical data.

Even at the present stage we are not able to prove this contention, in all its details, by objective scientific methods. There are, in my opinion, two main factors accounting for this difficulty. The damage caused by an upbringing away from the family circle is not immediately open to observation by untrained observers. Toddlers in a good institution may look well fed and well clothed, and may be well behaved. It is only on closer observation and with the knowledge of adult psychopathology in mind that the fact that these children cannot form a good object relationship will become apparent. Miss Fildes drew attention to this recently when she talked to this Section of her experiences during her investigation for the Curtis Report. It is, therefore, only a small number of trained observers who perceive the disturbance, and whose opinion will stand against that of the vast majority of lay people and even professional workers who judge by appearances only.

The second reason is the inherent difficulty of proving these hypotheses. Our knowledge of the damage caused by an unsatisfactory early upbringing was originally not derived from the observation of children, but from the treatment of adult neurotic patients. This enabled us to understand unconscious processes as well as conscious ones. It opened to us hitherto unknown recol-

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lections of our patients' past experiences. The psycho-analytical treatment of adult neurotic patients allowed Freud (3) to reconstruct phases of instinctive and emotional development during the first five years, which were later confirmed by the analytical observation of children. Nowadays it is very easy to find clinical observations confirming some of these hypotheses. The small child's sex curiosity can be openly observed. But, as the hypotheses dealing with mental structure have a dynamic and genetic aspect, it is extremely difficult to formulate propositions open to experimental proof. Many attempts of this kind have been undertaken in the last decade or two, especially in America, but only few of them are really successful. David Levy (5), for instance, tried to measure sibling rivalry in different groups of children. In the experimental situation the behaviour and verbalizations of the experimenter were controlled and the reaction of the children was carefully observed. The data were treated statistically with relation to age, position among siblings, type of reaction and so on. A number of typical reactions were described and certain conclusions were drawn from the experiment. But what the author overlooked is the fact that he is not investigating a single factor—sibling rivalry—but a complexity of factors. The child's reaction in the experimental situation is not due only to his feelings for the younger sibling, but is dependent on the sum total of his emotional development inside the family circle. The strength and nature of the reaction may depend on the child's relationship with adults far more than on the single factor of sibling rivalry. The influence of past experiences is not measurable in that particular experimental situation. The same difficulty presents itself in the frustration experiments of Barker, Dembo and Lewin (1), who, when they prevent the child from getting the coveted toy, are not able to take into consideration the child's former experiences.

The positive factor in all these, and many more experiments of the same kind, is the attempt to create experimental situations in which single dynamic factors can be observed under controlled conditions, allowing for quantitative estimations. But, so far, the results are not very far-reaching, and only some of them, one of which I shall mention in more detail later on, can help us to prove our contention that family life is the necessary pre-requisite for normal emotional and character development.

It is, of course, not possible to view the whole complexity of the problem in this paper. I shall, therefore, discuss the importance of the family setting in respect to—

- (1) The modification of primitive instinctive drives, which allows later social adaptation.
- (2) The significance of the first object relationships, on which ego development is dependent.
- (3) Super-ego formation, which is the most far-reaching step in gaining moral independence.

These three aspects of personality development are, of course, closely linked up with one another and separation is artificial, but for theoretical purposes I shall have to discuss them one after another.

At this point I should like to mention that the scientific background of my

deductions is that of the psycho-analytical theory, which I find the best working hypothesis at our present stage of knowledge.

It will be necessary to make a few general statements, the validity of which I shall take for granted for the purposes of this paper. I believe they are more or less accepted if not always expressed in the same language:

(1) The most important period for the formation of later behaviour patterns occurs during the first five to six years of life. This does not mean that very important changes may not still occur later on, but the structure of the personality is already formed at the beginning of the latency period.

(2) The environment during these first years is represented by the actual persons handling the child. Material conditions exert their influence only indirectly, in so far as they may shape the attitude of parents or parent substitutes.

(3) The mental structure and character of a person is the outcome of an interaction between innate forces and forces emanating from the environment. Amongst the innate endowments the instinctive urges are the medium of mental energy.

(a) ON THE TRANSFORMATION OF PRIMITIVE INSTINCTIVE DRIVES.

Instinctive urges, libidinal and aggressive ones, pass through certain phases of maturation. According to the erogenous zone we distinguish an oral organization of instinctive urges as being predominant during the first 14-16 months of life, an anal-sadistic organization during the second and part of the third year, and a phallic organization between the third and fifth year of life. It seems important for later mental equilibrium that, hand in-hand with this biological process of maturation, a corresponding emotional development should take place, and this is to a considerable extent dependent on the influences arising from the environment. It is on this point that interaction of constitutional with environmental factors can be shown most clearly. Infants show individual differences of reaction from the first day of life onwards, and the same attitude of the environment will have a very different effect on different types of babies. As far as the instincts are concerned, there seems to be a difference in their strength or quantity. There is also, perhaps, a qualitative difference, which only becomes apparent some time later in so far as one instinctive urge may be more pronounced than others, thereby constituting a different distribution of instinctive energy altogether. In some children anal-sadistic trends are very strong, in others exhibitionistic tendencies seem of outstanding importance, without any encouragement from the environment. Margaret Fries (4) has studied the "congenital activity types" of infants, classifying them into quiet, moderately active and active infants, and draws attention to the fact that these three types of infants approach similar situations in a different way.

For the purposes of this paper I shall neglect these constitutional differences, as I should like to stress generally valid factors of emotional development more than individual varieties.

Many instinctive urges, libidinal and aggressive ones, which make their appearance during this early process of maturation, are by their very nature

antisocial and have to be transformed. This occurs under the pressure of the environment reacting against these primitive tendencies. As these instinctive drives are representative of mental energy, their modification should proceed with as little loss of driving force as possible. Sublimation, whereby the energy behind the drive is being preserved, and only its aim is being changed, is more satisfactory from the economic point of view than reaction formation, whereby the energy behind the original drive is being used to build up a counter drive of an opposite character. But both these mechanisms are more economic than repression, because there the energy and content of the primitive drive are both being kept away from consciousness and action by a force, which in itself uses up new energy if it is to remain effective. The far-reaching effect of a satisfactory, that is economic transformation, of early antisocial drives has to be seen in its entirety in order to estimate its enormous importance in character development. If we take as an example an aggressive drive, for instance the desire to hurt another child, this can undergo many modifications, leading to very different end-results as far as character development is concerned. To discuss a few of the possibilities :

(1) It may be sublimated. The desire to hurt may be diverted from human beings to animals and then on to toys. The pleasure in destroying toys may slowly be diverted into the pleasure of constructing, and may from there lead to a general interest in technical matters. This is only one possibility of the sublimation of an aggressive drive, but it shows already the instinctive basis of many of our daily activities.

(2) It may be transformed by reaction formation. The energy which was behind the desire to hurt may be used up in order to feel pity for the other child when it suffers and, thereby, prevent further aggressive acts. Pity, or the capacity to pity, is a character trait ; it may also, later on, play an important part in the choice of profession or other ego synthonic achievements.

(3) The aggressive drive may be turned into its opposite. The pleasure the child originally derived from hurting another child may now be derived from the desire to be hurt. This may lead to a masochistic orientation.

(4) The desire to hurt may be repressed altogether. The wish and its driving force sink back into the unconscious. For a time aggressive tendencies may disappear from the child's daily behaviour, and close observation will show that energies have also been withdrawn from the child's other activities. He will become shy, timid, afraid of tackling new objects and so on. This repressed instinct, which is now cut off from further modification, may, in certain circumstances, come to the surface again. The aggression of anti-social children, especially of boys, is very often a second edition of earlier aggressive drives, which have been repressed, and are rising again in their original form as a defence against passive desires.

I have given this rather schematic picture in order to indicate, in a somewhat simplified form, the relationship of a satisfactory transformation of early instinctive drives with character formation. I should like to emphasize that all these, and many more, mechanisms play a role in the psychic structure of every individual ; everybody represses and sublimates. A favourable outcome is a matter of quantity rather than quality—whether, relatively speaking, more

economic or more uneconomic means of transforming antisocial instinctive drives were used.

This first period of instinct development is important not only from the point of view of character formation, but also because it is during this time that the basis for later neurotic illness may be laid. It has been mentioned that normally instincts run through certain phases of maturation. At any of these phases libidinal as well as aggressive instinctive urges may become arrested, thus establishing a fixation point. This, together with certain inherited inclinations, constitutes the predisposition to neurotic illness.

Under which conditions can the transformation of early instinctive drives proceed most satisfactorily?

This is easily expressed in theory, but in practice it is extremely difficult to achieve. The expression of instinctive urges in any stage of this process of maturation should to a certain extent be admitted and encouraged, and the pressure against these drives should be very slowly administered. There should be neither too much gratification nor too much frustration against any one of these primitive antisocial drives. If the environmental pressure is too strong and too quickly or too early applied, mechanisms like repression will outweigh the more favourable mechanisms of sublimation and reaction formation.

Suppose that at the time when a child is most interested in its excretory functions the mother is equally, though unconsciously, excited by the same functions; she will pay constant attention to the child's excretions, will not allow him to use the lavatory alone, etc. Under these conditions antisocial urges, which should have been slowly modified, will remain in their original form for too long as gratification is constantly forthcoming. Eventually they will have to be repressed instead of, for instance, sublimated. If, on the contrary, training for cleanliness has been effected too soon and too quickly, these instincts will not have found any gratification at the proper time, and the desire for them will remain unchanged, even though repressed, and will hamper further development. At the same time, in both cases, this phase of instinctual development will retain too much libidinal and aggressive energy, and will, therefore, constitute a weak spot in later development, a fixation point to which the libido may at any time regress.

The foregoing exposition of the modification of early instinctive drives may give rise to the idea that it would be advantageous if early education were to proceed in specially adapted institutions under trained personnel, who would apply gratification and frustration in the appropriate dosage at the appropriate time. This might appear a good plan, especially as it seems very unlikely that one can train mothers all over the world in instinct development and its handling. I have mentioned the danger of discussing an isolated factor of character development before.

It has been stated that character development proceeds by an interaction of innate tendencies with forces originating from the environment. So far, the development of these innate tendencies has been described. No consideration has been given to the reasons why the child wishes to satisfy these innate drives, and for what reasons he can abstain from doing so.

(b) EARLY OBJECT RELATIONSHIPS.

It is, of course, common knowledge that the satisfaction of instinctive drives causes pleasurable sensations. The infant, during the first weeks of life, knows no more than the tension caused by a rising instinctive urge, like hunger, and the pleasure experienced when the drive is adequately satisfied. The infant and small child, certainly before the development of a more consolidated ego, but to a certain extent up to the time of super-ego formation, is dominated by the pleasure principle. It seeks to gain what causes pleasure and to avoid what causes pain, and at this early time the demands of the external world or the pressure of the environment do not directly exert any influence.

The reason why the small child will eventually exchange the pleasure for the reality principle, that is to say will take into account the demands of the external world, apart from his desire to satisfy his instinctive urges at all times and in all places, is his relationship with his mother, which grows into an equally, if not stronger force, than the demands of his instincts.

This relationship, which is primarily built upon the fact that the mother is the first person to satisfy the infant's bodily needs, grows into a strong emotional bond in the second half of the first year. A baby, at the age of about nine months, needs his mother's presence at all times, not only when he is hungry or cold. He follows her around with his eyes; he wants to touch and fondle her, and is extremely unhappy, and often in despair, if his mother leaves him for any length of time. The processes which bring about this strong emotional tie are complicated ones, and are primarily dependent on the fact that the mother offers herself as an object for the satisfaction of instinctive urges. The child can begin to distinguish between the self and the external world whenever one of his instincts is not satisfied, and so learns in time to connect the pleasure of satisfaction with the presence of his mother. This distinction between the self and the external world is the first step in ego development, which, therefore, comes into being in the relationship with the mother, and the progress of which is dependent on the course this relationship takes.

The disastrous results of separation from the mother at this early age and institutional care in her stead are one of the few points which have been corroborated by objective scientific methods.

R. Spitz (6) undertook a controlled experiment with a view to examining the influence of the mother's presence on the child's development during the first year of life. The objects of his investigation were babies living in two residential nurseries—Foundlingshome, in which infants had no relation to adults except for feeding times, and Nursery, in which the mothers themselves were entrusted with the care of the babies. To assess development he used the Hetzer-Wolff baby tests. He found that, although the developmental quotient for the babies in Foundlingshome was higher at birth than in Nursery, the curves crossed between the fourth and fifth month, with Foundlingshome showing a steady fall until the end of the first year and Nursery showing a steady rise. All the factors of similarity and dissimilarity between the two homes were carefully recorded, and the relation of each of them to the developmental quotient was worked out. Using the same material, Spitz draws atten-

tion, in a second paper entitled "Anaclitic Depression" (7), to a syndrome appearing in some of the 123 infants examined, showing great similarity to what we later on call depression, in the second half of the first year. In all the cases which showed this syndrome the only significant fact in common was that the mother had been removed for external reasons for a period of at least three months between the sixth and eighth month of life. During the period of the mother's absence the developmental quotient went down considerably as the infants became completely inactive and withdrawn. Restoration of the mother within a period of three months led to a disappearance of the syndrome; in some cases this occurred within a few hours, with a correspondingly spectacular rise in the developmental quotient.

These objective investigations prove beyond doubt that the child's early ego development is closely linked up with his constant contact with the mother and dependent on this emotional tie.

To come back to the question of why the child can postpone the gratification of certain instinctive urges: against this original desire there stands an equally strong force, namely, the approval or disapproval of the mother, or the love or loss of love of the one object with whom the child has formed a strong emotional tie, and on whom he feels utterly dependent for his very existence.

If, therefore, modification of early instinctive drives is to proceed satisfactorily, there must be a strong and uninterrupted mother-child relationship. The reasons why such a relationship can be developed best within the family circle are obvious. The mother herself has strong feelings for her child, and has, at any given time, only one child of the same age to care for. She can, therefore, external conditions permitting, devote her love and time fully to the infant. To a certain extent this normal relationship can be replaced by giving the child a substitute mother, who fulfils most of the requirements of the real mother. But this substitution is very difficult if not impossible to achieve in even the best institution.

Experiences in war-time residential nurseries, well equipped and working under the best possible conditions, showed that at the end of the first and often also the second year, the children were in many respects far behind the developmental age of toddlers who had grown up under bad family conditions. Anna Freud (2), in *Infants without Families*, analyses the differences of instinctive and emotional development under nursery and home conditions, and comes, on the basis of her rich experience, to the conclusion that even with a full knowledge of all the factors mentioned, one is not able to create conditions in a residential nursery that will make them equal to the home environment.

(c) SUPER EGO FORMATION.

So far only the mother has been mentioned as influencing early development. It is quite true that the relationship with the mother during the first two years of life is much more obvious than with the father, although he is already becoming an important figure during the second year of life. The father represents the power and richness of the external world, and is considered

even more omnipotent than the mother, as he reinforces her educational efforts. The influence of the child's relationship with the father, which, as with the mother, undergoes a complicated development due to the appearance of ambivalent strivings, becomes very strong and equally important in the development of the super-ego.

When the child, out of love for his mother, gives up a desire, for instance the pleasure of wetting, he can do so by identifying himself with his mother's demand. Unless the educational pressure achieves this step the child's behaviour will remain very unstable, and lapses will occur all the time as soon as the mother leaves the room. This identification with the mother's demands is the first step in the building up of a moral code in the child. The decisive step in super-ego formation, however, occurs as a result of the decline of the oedipal phase, towards the end of the fifth year. At this point the child gives up most of his sexual desires for the parents and in its stead identifies himself with the parent, especially with the parent of the same sex, but to a certain extent also with the parent of the opposite sex.

This identification is more far-reaching than any other identifications that have occurred before. It embodies an internalization of everything both parents have represented during these first years of life. From this time onward the child's actions are governed much more by the demands of his super-ego than by those of the real parents. Together with the internalization of the images of the parents there is an internalization of all the demands the parents stood for—that is to say, an internalization of the moral code prevalent in the child's environment.

The question could be raised whether the real parents are the best people with whom the child should identify himself and whose moral code he should adopt. One might suppose that wardens of a hostel with an impeccable character would offer better objects than many parents.

Needless to say this is not so. The basis for this identification is the strong emotional bond which the child has developed with both parents together with all the conflicts inherent in that developmental phase. Without the retaliation which the boy feels threatening from the father, whom he wishes to rival and remove, no real pressure is behind this process of identification and it may not take place successfully. I think we are all aware of the super-ego defects in institutionalized children, and especially in delinquents who come from broken homes. In addition, the child does not identify himself with the parents as they really are. When this identification takes place, the parents are still idealized and perceived as wonderful and omnipotent people. When later on the child realizes his parents' shortcomings, this will not harm his own moral code, which was formed after the picture of the ideal parents. I do not wish to imply that no difficulties occur during this time of super-ego formation, and that if only the parents are there no harm will be done. Quite the contrary. This time of the decline of the oedipal phase, which, as we have seen, is the last stage of infantile emotional development, is fraught with dangers and dependent on the earlier development, many disturbances may occur: identification may take place, especially with the parent of the opposite sex, which may lead to homosexuality. The process may not achieve a satisfactory solution if

aggressive instincts are too strong and are turned inward and added to the super-ego; we regularly find this condition in later obsessional neurotics. The only statement we can make is that normal super-ego development is dependent on family life—the child must have parents to identify himself with.

There is interesting confirmation of these facts in Anna Freud's *Infants without Families* (2). Anna Freud shows how children, who had no fathers and children whose fathers were absent during their stay in the nursery, built up phantasies around these fathers, denying their death or absence and giving them supernatural powers. This shows that there is a tendency in children of our culture to look for parents, even if they are not present and even if they have never experienced family life. But there was a great difference in the super-ego development of these children and those who were growing up within a family, with a real father present. These phantasy fathers were made to conform with the child's wishes rather than to restrict the child's antisocial tendencies, and an identification with this phantasy father did not lead to the incorporation of an enduring ethical code. Anna Freud maintains that it is in this phase of personality development that institutionalized children are at a special disadvantage.

The development, therefore, of an ethical code that will be strong enough to govern the individual's future actions is dependent on the existence of family life.

I have tried to show by examples of three aspects of early emotional development the transformation of instinctive drives, the first object relationship and the formation of the super-ego, that family life is the place where this development can proceed most satisfactorily. There is no doubt that it could proceed much more satisfactorily if more attention were paid to educational work with mothers of children under five years of age. It is often maintained that disturbances in young children are due to wrong handling, caused by irreparable personality defects in the mother, but in my experience in the majority of cases the mother of the very young child, if skilfully handled, is able to adapt her treatment of the child to his needs as soon as she is made aware of them. Although this does not come within the scope of my paper, I felt that I could not close my remarks without drawing some attention to the amount of work which should be done in all those cases where children do live within their family.

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DYNAMICS OF CREATIVE ACTIVITY.

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"No collection of facts is ever complete because the Universe is without bounds, and no synthesis or interpretation is ever final, because there are always fresh facts to be found after the first collection has been provisionally arranged."

A. Toynbee.

I.

UNDERSTANDING of the nature of art has been approached from aesthetic and psychological viewpoints. Below a critical survey is made of the pre-existing standpoints, attempting a synthesis of the diverse aspects. To avoid discursions only the main trends of the various researches are mentioned. All the remarks on art concern paintings, if not mentioned otherwise.

II.

Psychopathological studies into psychotic art inquired into the psychology of creativeness, but their aim of analysing and formulating the nature of creative activity remained unfruitful. These studies, following Mohr's work, at least established the descriptive terminology of "insane art." For instance, the schizophrenic mental manifestations in drawings were not only recognized and described, but they became part of the diagnostic armoury. Such symptomatological products in paintings are condensation of meaning, dominance of symbols, and pictorial agglutination; stereotypy, preservation, and over-elaboration; lack of integration, chaotic organization and inappropriate colour choice. Ultimately the investigators took two different directions. One group limited themselves entirely to descriptive activities, which enriched the diagnostic armoury but had little reference to the psychology of art (e.g. description of motor inco-ordination in drawings of seniles). The second group of investigators lost themselves in theoretical considerations resulting in concepts such as the "universal urge for expression . . . manifested in form tendencies" (Prinzhorn) or "the creative force of the subconscious" (Jung). Such postulates are akin to aesthetic postulates, inasmuch as they are non-biological.

Weygandt, when studying art products in relation to the artists, noted that mental illness may (1) extinguish art, (2) may not affect art, (3) may facilitate a dormant talent, and (4) may cause a change of style. All these classifications were elaborated by yet another group of investigators, who correlated the art products and life-histories of known great artists. The aim of these pathographists was to elucidate the aesthetically incomprehensible in some of the art products (Lange-Eichbaum).

Although the concept "sublimation" to explain art activities remained unsatisfactory, psychoanalysis contributed to a deeper understanding of the psychology of art. It did so by analysing the functional significance of art products for the artist himself and by recognizing the function and nature of magic. Kris and Pappenheim emphasized that the psychotic artist creates in order to transform the real world. Thus the work of psychotics is part of the magic itself, in order to readjust to reality. Wulff seems to come to similar conclusions by emphasizing that the pictures of schizophrenics are unsuccessful attempts to restore the personality. If one were to attempt to generalize one would be inclined to state that every art product may be looked upon as subserving a cathartic function in the artist's struggle for readjustment. Analytical interpretations, however, are essentially psychopathological ones, involving controversial questions, such as the basically pathological nature and function of culture (Roheim). Maybe because of the over-emphasis on psychopathology, psychoanalysis succeeded in elucidating the dynamics of totemistic art, but failed to understand the murals of Altamira. However, as previously emphasized, the recognition of the functional significance of art products brought us nearer to the understanding of the nature of art.

Studies of eidetic phenomena revealed the presence of predominantly visual or eidetic imagery till puberty in over 40 per cent. of children, and the altered electrical activity of the brain of eidetic adults was confirmed by EEG. It appears, however, that children's mental phenomena are not so much dominated by eideticism as by perceptual factors. It was said that conceptual thinking proper probably does not fully develop till puberty. In the predominance of visualistic thinking children, primitives and schizophrenics show analogous trends. Schilder analysed drawings of patients with head and brain injuries and described formal elements resembling those of schizophrenic art products (changes of configuration, preservation, "horror vacui," etc.). He concluded that the basic disturbances are those of the figure background relationship, thus approximating to Goldstein's researches and the problems of gestalt formation. Goldstein also showed that patients suffering from receptive aphasia exhibit lack of conceptual thinking as expressed in their descriptive "visualistic" language. The significance of studying artistic products in connection with organic brain lesions directs the problems of artistic creation towards brain pathological analysis. Reitman in connection with bilateral prefrontal leucotomies noticed a transient creative activity in schizophrenics' paintings. He emphasized the presence of thought disturbances in the sense of concreteness.

From the experimental viewpoint stimulation of visual hallucinations by mescaline was attempted. It was found that the induced visual hallucinations were individualistic and dependent on the subject's personality, but that the common experience of the mescaline-intoxicated subjects was a disturbed time-space relationship.

III.

The simplest way of attaining a synthetic approach appears to be the application of the results of the enumerated studies to aesthetic definitions.

Read's definition of painting is that it gives pictorial expression to ideas. Similarly, but in a more elaborated way, Newton defined art as being an original human conception made manifest by the skilful use of a medium. An artist, e.g. a painter, has to have original imaginations, or ideas in form of visual conceptions, and he has got to possess an urge, a desire to communicate them. He must have craftsmanship, which enables him to make "skilful use of a medium"—that is to say canvas, paint, brush, etc.

Of this definition the last point, namely craftsmanship, may not need analysis, as it is a commonplace that craftsmanship can be acquired by everybody to a certain extent. The problems of reproduction of form and shape are well defined and can be equally well taught and learned.

The requirement "original imagination of ideas in form of visual conceptions" can be analysed in connection with the aforesaid researches. Cassirer showed that the "situational" or concrete experiences of children, primitives, schizophrenics and of patients with organic brain injury are replaced by the "abstracted" attitudes of thinking in normal adults; he showed that this development of abstraction led to building up or rebuilding the world again. Goldstein expanded the concepts of "concrete" or "situational" and "abstract" or "categorical" attitudes as the basic modes of psychological existence. Thus he denied the pathological nature of the concrete attitude. Now to have "ideas in form of visual conceptions" involves the loosening of abstract concepts which in turn alters the world again, this being re-experienced from another "basic mode of psychological existence." The loss of conceptual thinking is replaced by visualistic thinking—that is to say, all experiences have an immediate visual quality. In this connection it may be recalled that the fundamental disturbance of the mescaline intoxication was an altered time-space relation, which was also noticed by Schilder in patients with head injury. Such experiences necessarily disturb the categorical abstract thinking opening, the way to visualistic thought processes. One of Guttmann's mescaline subjects complained: "Each word I thought was connected with a picture. This hindered my thinking, as the concrete pictures held me." Such observations suggest that the visualistic experiences of mescaline-intoxicated subjects run parallel with altered thought-processes. Furthermore these parallelisms seem well in accordance with the outlined grouping of observations, namely, that patients' artistic activity (painting) involves a disturbance of thought processes.

Schilder, Goldstein, Bychowsky and others observed that disturbed time-space relations are interconnected with body image disturbances, with magic experiences and with concrete attitudes. They observed that the perceptual functions of patients with concrete attitudes are accompanied by altered figure background experiences. In other words, in disturbances of conceptual thinking not only does the perceptual factor become dominant, but its elaboration altered as well; hence the quality of it becomes changed.

From the point of view of style, art products of painters can be subdivided into representational and ornamental paintings. The representational artist interests himself in problems of form, shape and craftsmanship. The ornamentalist's interest is focused on devitalization and on pattern. The representational artist is active, vital and romantic; the ornamentalist is passive

and mystic. Thus the stylization is partly determined by typological motives. The representationalist brings in subjective elements by demonstrating his individualistic perception of the world, and by altering the actual reality. The ornamentalist modifies reality by affective selection of essentials, by geometrical simplification, by form repetition and multiplication and by bilateral symmetry (Kretschmer). Furthermore, Schilder and Levine emphasized that the appearance of geometrical forms suggests particularly primitive drives.

The alteration of style towards the ornamental, the dominance of pattern, are well known symptoms of psychotic art products. Pattern as an aesthetic concept means the subdivision of shape, or in broader sense, of space; its dominance may well be an expression of altered gestalt formation, the "horror vacui" and of primitive drives. But whereas the non-psychotic artist preserves the capability of retaining unity in elaboration, the psychotic is lacking in synthesis of the patterns. Hilderbrand emphasized this by stating that "what holds art together is its assertion of an ideal spatial unity in contrast to the surrounding space." Thus the organization of the figure-background relations is a significant character of non-psychotic paintings.

The "urge," "the desire to communicate visual experiences" was well analysed by the recognition of the principles of magic. It may be recalled that magic experiences are inseparably involved with projection of affects, with loosening of the ego demarcations. Contrariwise, the detachment of the ego from the outside world is one of the characteristics of abstract thinking. The only controversial point at this juncture is the question whether the magic is directed outwardly or whether it involves entirely the internal environment. From what has been said above this question would appear to be superfluous. With unacquired ego demarcations (animism) or loss of them (schizophrenia) no delineation can be made between external and internal reality, as they became identical. It is still the expanded or dissolved ego which is influenced by the magic. It should be noted that only 2-5 per cent. of the schizophrenic patients and about 8 per cent. of brain injured cases (of my own material) did show spontaneous creative activity. As magic experiences are found in far greater numbers in schizophrenics than creative activities, magic experience alone cannot be the only impetus to artistic activity.

Some synthesis is already apparent. Paintings, as creative activity of patients, depend on the discussed factors. The patient's thinking process as emphasized has to undergo alteration in the sense of loosening of abstractions replaced by visualistic thinking. Only if his experiences are of visualistic character, that is to say, the altered perceptual elaboration is dominant, will he become a painter. The altered perceptual elaboration denotes disturbed gestalt formation based on altered time-space experiences. Head emphasized the importance of the equipotency of all cortical integrative impulses. It appears that in artistic activity, which can be looked upon as one of the highest integrative functions, this equipotency is altered in favour of visualistic elaboration. But the artist has to possess magic experiences as well, in the form of altered affects, to have sufficient urge to give pictorial expression to his experiences. The coincidence of all those factors together with technical possibilities offers the basis of creative activity of the patients. As this co-

incidence is irregular it may explain the relatively low incidence of artistic activity in hospitalized patients.

IV.

In the foregoing, criteria of creativeness in patients have been outlined; now the applicability of these criteria to artists in general should briefly be examined. The difference between creative artists and non-artists is not determined by the artist's craftsmanship, but by his qualitatively different experiences. Because the artist thinks in visual terms his conceptions are of the concrete type. This, of course, does not imply that artists are lacking in true conceptual thinking, but that in them the basic modes of psychological experiences are mixed. The altered elaboration of the perceptions is present in the non-psychotic artist to a degree. Seeing things in the fire, or in the clouds, Leonardo's advice on inspiration, etc., are some random instances of this.

In support of this hypothesis a group of painters and a group of non-artists were matched for chronological age and vocabulary age (on the Shipley scale). Both groups were tested for conceptual thinking with (1) a modified version of the Vigotsky test and (2) a verbal card-classification test, where only an abstract grouping would yield the required number of groups, but in which an alternative situational classification was strongly suggested. The sample as yet is small for the results to be statistically significant, but the differences in the meantime taken, together with the accompanying remarks of the subjects, were indicative that the artists found greater difficulty in breaking away from a suggested perceptual or situational grouping to a more abstract one. Further psychometric investigations are still continuing.

Magic experiences of non-psychotic artists have been evaluated analytically, and the revitalization of the environment in creating a picture is a magic action itself, strongly motivated by subconscious factors. On the other hand, in psychotic art the subconscious appears directly, and not merely as a motivating force.

The striking similarities between the so-called modern and the psychotic art gain in significance as the former is increasingly appreciated. Art appreciation is a cathartic experience, accompanied by a factor of distance (Bullough, 1912). But art appreciation depends on ideational and perceptual conditioning of the social environment. As long as the artist employs appreciable patterns, his work may induce response, hence it fulfils a social function. Modern art, as a result of individual and social interaction, re-conditioned our perceptual appreciation. Later on, however, modern art not only broke away from habitual patterns, but the choice of content altered as well; the surrealists choice for instance is the direct representation of the subconscious itself. Dali's definition of surrealism is that it is the art of a "critical paranoiac," in other words, surrealism is a conscious mobilization and utilization of schizophrenic mechanisms. If Dali did suffer from a schizophrenic episode, his paintings depict true experiences. The surrealists, however, attempt artificially what Dali might have done with spontaneity. Their art products

are only significant because these pictures represent contemporary personality trends; they reflect on strong destructive tendencies in our present-day attitude.

V.

Finally, the other creative arts should be briefly examined in connection with the problems discussed. Prinzhorn and several other workers were able to extend their observations on painters to psychotic sculptors as well. The rarity of psychotic sculptors can be explained partly by the technical differences between painting and modelling. Although both arts are visualistic and concerned with problems of space, the sculptors' experiences are restricted to shape and mass. It is probable that as sculpture involves more craftsmanship, the pleasure value of handling the material itself is greater than the use of brush and paint. In general, however, all that has been said about psychotic painters is also applicable to psychotic sculptors, and the parallelism between the psychotic and normal holds just as it does for painters.

Composing is less hampered by technical difficulties in hospitals and institutions, yet the number of observations on musical compositions is not extensive. This is to be expected, since composing denotes the organization of musical ideas by musical symbols which are of the most involved conceptual or abstract quality, and it may be added that their configurational value is higher than those of the mathematical symbols. The symptomatological points in composition, such as oddities, musical verbigeration, poverty of melody, or flight of melodies, etc., have been described. Felber, Rentsch and others noted the hypertrophy of tempo and rhythm at expense of melody in compositions of the mentally ill. Clinical investigations into amusia showed that the propositional value of music is negligible and that amusia is greatly determined by affective factors, and cerebral localizatory attempts have been refuted (Feuchtwanger).

Cognitive changes, such as disturbed time relations, altered gestalt functions, hypertrophy of affective elements may well be found in psychotic music. In drawings of psychotic artists the dominance of pattern was demonstrated, and it was shown that this is partly determined by primitive drives. The "horror vacui" as one of these drives was mentioned, whilst altered gestalt formation was considered in the perceptual sphere. Now music is a temporal and not a spatial art. The dominance of tempo and rhythm in psychotic music (*vide supra*) represents a regressive phenomenon towards more primitive drives. The filling in the space as an expression of the "horror vacui" finds its counter part in filling in the time as an expression of "horror temporis." The loss of sense of melody may well be an expression of altered gestalt formation as melody is an organized unit. Furthermore, an opus as such has a configurational property, and this completeness of music is also lost in the psychotic compositions. The dominance of the affective elements does not need special emphasis; music is fundamentally affective, and the magic component of it was known before it was formulated.

Finally literary art was the subject easiest to approach psychopathologically. Pathological phenomena, such as described in connection with paintings,

found innumerable expressions in the literary art activities of patients. But they have merely symptomatological significance. Pathographies are numerous, and those of known authors have been written and re-written by members of various psychological schools of thought.

Literary art operates with abstract concepts; if those are lost the work becomes merely of symptomatic significance. If the conceptual element is merely loosened the pattern of words becomes dominant over content, and nonsense poetry develops. This is the only literary manifestation of the shift of conceptual thinking towards perceptual thinking. When analysing the nonsense poetry of Edward Lear, Reitman drew attention to the manifestation of body-image disturbance, and Schilder emphasized the expression of distorted time and space relations in Lewis Carroll's nonsense. Thus the same mechanisms are at work as were mentioned in connection with head injuries and mescaline intoxication. Although one can look upon poetry as a hypertrophied gestalt formation of verbal nature, the art of words does involve perceptual factors only to a lesser degree and demands abstracted thinking. Verbal magic, too, has been analysed and described. Literature, however, is essentially propositional, that is to say subserves a conscious appeal to the outside world, and because of the appeal to the outside world the importance of external influences (the appeal of ideologies) is evident. Magical expression as well as perceptual dominance are isolated instances.

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THE MEDEA COMPLEX: THE MOTHER'S HOMICIDAL WISHES TO HER CHILD.*

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Δύναται γὰρ ἴσον τῷ ἔργῳ τὸ νοεῖν.—Aristophanes.

("To think evil is very much the same as doing it.")

INTRODUCTION.

A COMPLEX is a group of emotionally invested ideas that have unconscious activities. Contrary though it be to the popular and sentimental idea of an overriding mother love, it is common, especially in child psychiatry, to find a mother's lively hatred and even homicidal wishes towards her child. I consider that this should be called "The Medea Complex."

CLINICAL.

The following cases illustrate it—the first five in increasing severity, while the sixth shows that the death wishes may be directed against the unborn child in the womb, and the seventh that the presenting symptom may be the mother's dread that she will injure her child.

CASE 1.—Jack, a 14-year-old child, was brought to the clinic in March, 1941, by the Probation Officer with the complaint that he had been dismissed from two posts for stealing, and had been convicted by the Court. His father, a railway clerk of 48, had lost a leg in the war of 1917, and apart from trying to shield Jack, was something of a cypher in the case. His mother, superficially agreeable and attractive, was a hard, aggressive woman of 43, formerly a manageress in a shoe factory. The home was materially comfortable. Jack had undergone painful circumcision when sixteen days old, had later had a septic thumb after measles, and when six years old suffered from pneumonia followed by empyema, drained by operation. His mother had tried to beat Jack into shape, occupied herself much with punishment, and showed him great hostility, giving a long account of his numerous misdeeds. She ended her story by recounting with ill-concealed satisfaction how when she had fetched him from the hospital after his illness, the ward sister had said, "I am very pleased to get rid of this young man of yours; he looks very angelic—but my word!" From the way in which she related this it was evident that those were really her own sentiments, and that she wished that she too could have rid herself of him.

The boy did well with treatment, in the course of which he showed an exceptional amount of unconscious fear of his mother.

CASE 2.—Harriet, an adopted child, aged 8, was brought to the clinic by her mother in November, 1936, with the complaint that she was beyond parental control. Her father was a clerk of 47, the mother being 36. After ten years of childless marriage hysterectomy had been performed, and a year later Harriet was adopted when eight months old, being chosen because she was dark like the

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parents, and so might pass for a natural child. They were of only moderate intelligence, but Harriet turned out to be brilliant, and she repeatedly outwitted them. Her mother was smug, and her feelings for Harriet were ambivalent, with a half admiring "I would never have dared when I was a child" attitude and a considerable overt hostility. Harriet accosted men in the street and asked for money. She even took to stealing. Her mother said "I detest the child," and "I feel I could strangle her."

At the end of three months Harriet was a little better, but her mother broke off treatment, possibly because she was dissatisfied that we had not proposed the expulsion of the child from the home.

CASE 3.—Peter, aged 5½, was brought to the clinic in May, 1944, by his mother, who complained of his screaming, nervousness, restlessness, fear and naughtiness. His father was a soldier of 30, who had been away for three years. The mother, who was 31, had little idea of managing children, and showed increasing hostility to Peter, though she was tolerant of her other child, a baby boy of 20 months. She herself had been brought up in ignorance of sex, which she had never been able to accept, refusing intercourse for the first two or three years of marriage, and then only acquiescing with disgust. Peter was born after an operation for sterility, and his birth was followed by dyspareunia. Husband and wife quarrelled a great deal, and accused each other of unfaithfulness. Separation was contemplated. Peter's mother was angry and vicious to her husband and said that he was sulky and quick-tempered, and that Peter took after him, having an evil mind and being extremely jealous.

Peter's birth had been normal, he was bottle fed, and circumcised when ten days old. From the age of 2½ to 3 years he was billeted with a foster-mother, and on his return home he caught measles, followed by spilling some boiling fat over himself, and then by mumps. His intelligence was average, but he was actively hallucinated, and a diagnosis of dementia praecox was made.

His mother became more and more aggressive towards him, and was reported to give him little attention. She insisted that he must be sent away, and repeatedly said and wrote to us that she feared she would "do something to him," as he was working her up to such a pitch that she did not know what she was doing; already a friend had had to stop her from attacking him. She applied for her husband's compassionate release from the Army, and stated that if it was not granted she would take the baby with her and leave Peter alone in the house. Soon after this she put him in a room by himself, out of the way, as she could not trust herself with him. She complained that he had made her really ill, so that she had to spend a fortnight in bed. But she resented any suggestion that he was suffering from a mental illness, although later she asked if he would "go funny," and said that if anything like that happened to him she would kill herself.

Peter was so unmanageable that it was with great difficulty that an institution was found willing to accept and keep him, but each time he returned home the situation again deteriorated, and so finally he had to be permanently boarded out in a mental hospital which contained a children's unit.

CASE 4.—A single woman of 28 was seen in a general hospital in November, 1946, for an opinion on her sanity, since a charge of attempted murder and suicide was pending against her. She had been a nursing auxiliary and had fallen in love with an epileptic soldier patient, who bigamously went through a form of marriage with her in 1944. He himself was seen as an out-patient in March, 1946, when he said he was happily married, and was found to be a severe epileptic. The home was squalid. His offence was detected and he was convicted, but although he was violent to her and she was urged by her parents to leave him, they continued to cohabit. In August, 1945, she bore him a daughter, and three months later they moved to a new slum address. During the next twelve months he deserted her six times. On one of these occasions, in November, 1946, when she was almost destitute and without any coal, her landlady called for the rent, which was a fortnight overdue. Whilst they were talking he returned and became abusive. This made her desperate. As soon as she was alone with the child she swallowed 25 of his one-grain phenobarbitone tablets, put her head and that of her child in the gas oven and turned the taps on.

Hearing the baby crying and finding the door locked, the neighbours sent for the police, who broke it down. There was little injury to either party, and the patient, who left her supposed husband to return to her parents' home, was soon

afterwards bound over for two years at the Assizes. She had shown no antipathy to the child, but it appeared that the severe aggression in her attempted infanticide was really directed against the husband, and psychologically this case has much in common with the situation in Case 6 below.

CASE 5.—A married woman of 32 was first seen at an out-patient department in March, 1936, when she was depressed and self-accusatory, and it was complained that she rapped on the walls, rubbed dogs' excreta on her neighbour's child's clothing, door and gate, and stuck pins into her husband in bed at night. She voluntarily entered the mental hospital in April, 1936, but only stayed for a fortnight, and was readmitted under certificate ten days later. There was a history of her having been an industrious and conscientious young woman, who had married an indolent, inconsiderate fellow, and bore him a female child in December, 1935. The marriage had been unhappy from the first; he spent the whole of each morning in bed and gave his wife no help, and so things deteriorated to an extreme degree. In February, 1936, the child had been found dead in her cot, and at the inquest a verdict of accidental death was returned, it being supposed that she had accidentally smothered herself in her pillow. But the patient now stated that she had left her husband sitting downstairs, gone up to her child's cot, and smothered her with pillows. The husband denied this, stating that his wife had not left his side for the whole evening.

The patient went through a period of regression in which she was destructive, and degraded in her habits. She was miserable, showed intense guilt, and asked what the police would do to her when she left hospital. She said that she had killed her baby because she thought she was going to die and did not wish to leave her, and also that she had done so to bring her husband to a more sympathetic frame of mind. Finally she recovered after psychotherapy, left the hospital in August, 1938, rejoined her husband, and subsequently bore him another child.

CASE 6.—A married woman of 24, wife of a 26-year-old sergeant in the R.A.F., was seen in a general hospital in May, 1946, for hyperemesis gravidarum of four months' duration. Although she was said to be really ill and was depressed, she was lying beautifully posed in bed, well made up, wearing an elegant nightgown, and with her belongings tastefully arranged around her. The picture was that of a strongly narcissistic woman.

She stated that her parents were divorced when she was twelve, and that she had been married for five years. This was her third pregnancy and she had suffered from vomiting during each one. The first was ended by therapeutic abortion for hyperemesis at five months, and the second was a boy now three years old. She gave a history of emotional rejection of her husband at every coitus since the abortion, and said that she could not bear him. He himself gave a history of marital incompatibility. She asked the doctor to terminate her pregnancy, and if possible remove her ovaries as well, and said that when vomiting she hoped to get rid of the baby by the mouth.

She was unwilling to accept mental treatment, and as her condition deteriorated the pregnancy was terminated.

CASE 7.—A married woman of 37, previously a nurse, in which profession she had found her only happiness, was seen as an out-patient in August, 1942. She was tense and tearful, and said that her childhood had been unhappy because her mother had ill-treated her. The patient had been married for two years and complained that her husband, from whom she had separated for a time, did not understand her, being pig-headed and cool. Her daughter, Jean, had been born in February, 1941. Pregnancy and birth were normal, and Jean was bottle-fed. As soon as the patient got up she felt nervy and Jean's crying upset her. She said, "My one dread is that I should be cruel to my baby as my mother was to me." She had illogically sent the baby to her mother three months before and had felt much better since then.

A month later she was admitted to the Neurosis Unit as a voluntary patient because she was more depressed and feared she might kill Jean. She was agitated and melancholic and complained of impulses to infanticide and suicide. Following treatment by narcosis, she left recovered in December, 1942, after a three months' stay.

She was readmitted in April, 1943, with similar symptoms and left two months later slightly improved. She returned to hospital in July, 1944, with a mild recurrence, and left relieved after three weeks.

She was again admitted in May, 1947, with similar symptoms, though she no longer had a fear of injuring Jean, now six years old, but she now had a son Joseph, of 2½ years, whom she feared she would injure or kill. She also had suicidal thoughts. She left hospital recovered at the end of two months.

The first five cases form a graded series, from the common type (Case 1) in which the death wishes are not openly expressed, but are put into the mouth of some third party, often a school teacher, through the avowedly antagonistic parent (Case 2) who still keeps the child, and the still more hostile parent (Case 3) who disposes of him to a third party, to the case of attempted homicide (Case 4) and even probable actual murder (Case 5)—both of these last two cases being, like Medea, intensely depressed at the time of the event. Hostility between the parents was not apparent in Cases 1 and 2.

Case 6 is an example of rejection of an unborn child in a narcissistic woman, with hostility to her husband. It shows how the essence of the Medea situation can exist even in pregnancy.

Case 7 discloses a state of affairs sometimes found in melancholia, in which the mother is hostile to the husband and complains of such dread and apprehension of murdering her child that she is afraid to leave hospital or to look after him, but represses the actual homicidal wish.

Dyspareunia was prominent in Cases 3, 6 and 7, and appeared to be related to fear of pregnancy, due to dislike of the baby in the last two, and perhaps in the first.

ANTHROPOLOGY.

The killing of children seems to be general at a stage of civilization. It usually takes the form of child-sacrifice (Crawley, 1913), and is almost unknown in a savage society, i.e., one that depends for its livelihood exclusively on hunting, fishing and collecting (Childe, 1944), but common amongst barbarians, i.e., those who augment their food supply by cultivating edible plants, breeding animals for food, or combining both activities, and in some civilized peoples, i.e., those living partly in cities. Even down to our own time the penal sacrifice of offenders has outlived all others and is still accompanied by a religious ceremony. Human sacrifice is a sort of life insurance for the survivors, and may be compared to the slaughter of battle, the execution of prisoners of war, heretics and unbelievers, the *auto-da-fé*, devotional suicide, hara-kiri, and suttee. The victim is not chosen at random, a king being substituted for his people and a mock king or other person for him, a son for a father, and so on. He is regarded as a messenger to the gods. According to the Western Church, Christ discharged his punishment, due to the sins of mankind, and propitiated his Father's justice, in the capacity of a man, as a representative of the human race. The Greek Church regarded the death of Christ as a ransom of mankind paid to the Devil. In Morocco if a child dies it is customary to congratulate the parents by saying, "Your child took away your misfortune."

In China (Ball, 1913) about 587 B.C. a man buried two daughters with the King to whom he was grateful for his clemency to his father. It was, and may still be, the custom for new pottery furnaces in the Kiang-si Province to be

consecrated with the secret shedding of children's blood. Female infanticide was prohibited in 1873.

In Ancient Greece it is said that children were sacrificed to Melikertes at Tenedos (Grote, 1903), and girls were habitually exposed to death as soon as they were born. In his life of Lycurgas, Plutarch states that the Spartans threw all weakly and deformed children into the cavern Apothetae. The Boeotians would sacrifice a boy to stop a pestilence.

In India (Cait, 1913) at the beginning of the nineteenth century, the British Government stopped the practice by which Hindu women in Bengal consigned their firstborn to the Ganges in fulfilment of a vow to do so if blessed with a son. At the shrine of Kali at the great Saiva Temple at Tanjore, a male child was sacrificed every Friday evening until British rule forced the substitution of a sheep.

Among the aboriginal tribes of North-East India, the Chutiyas used to sacrifice the children of one particular clan, which received certain privileges in return. When a woman of this clan became pregnant astrologers were called in, and if they predicted a boy she was carefully tended and the baby anointed with a paste made of turmeric and a kind of pulse. Later, he was kept at the temple and fed sumptuously until plump enough to suit the goddess's taste. He was then shaved, anointed with the paste again, adorned with gold and silver ornaments, and conducted before the goddess's image, where he prostrated himself and was then decapitated by the high priest.

The Dravidian Bhumji kidnapped children for sacrifice, as did the Bhuiyas. Before beginning a journey the Banjaras, or pack bullock drivers, used to drive their bullocks over a child buried up to the shoulders. The Khonds used to sacrifice children to the earth goddess to avert misfortune and disease, gain victories, and ensure good crops. The victim was only acceptable if purchased, dedicated by his father, or himself the son of a victim. Khonds in distress sometimes sold their children for sacrifice, and they were often kept for years before being offered up, usually at the sowing of the chief crop, and to the accompaniment of music, dancing and other ceremony. Portions of the victims were divided amongst the householders of the villages, and buried in the various fields.

In the North of the Upper Chindwin district of Burma, small children, usually bought from the unadministered territory, were sacrificed at a big festival in August in order to induce good rice crops.

The Angami Nagas were head hunters, and a man was not allowed to don full warrior's insignia until he had killed a human being, even a child speared from an ambush, probably because the person whose head was taken would be his slave in the future life.

There is a superstition throughout India that buried treasure belongs to demons who must be mollified with blood before it is sought or removed. In Southern India the demons prefer the blood of a pregnant woman, who was therefore formerly sacrificed. It is also believed that large buildings and public works require the burial, in their foundations, of human beings, whose spirits will haunt and guard them; thus a local landowner had a girl killed and buried under an embankment that had collapsed several times. Since human

blood is believed capable of producing magical results, a man of Sibsagar decapitated his neighbour's son in 1854 and drank his blood in order to bring about his own child's recovery from fever, and similar acts are recorded in the present century, with the object of ensuring male or healthy offspring.

In Persia (Edwards, 1913), according to Herodotus, Xerxes and his wife Amestris buried some youths and maidens alive.

Roman law recognized under the *patria potestas* the right of the father to murder his own children. Didius Julianus sacrificed children in order to learn the future, and Elagabalus slew children and practised magic (Wünsch, 1913). At the "sacred spring" the Latins presented to the gods all the offspring of men and cattle born within a specified period. Mommsen (1901) naively excuses this by stating that the humans were confined to the convicted, or to the innocent who chose to die.

In Egypt it was customary (Macalister, 1913) to cast a young girl, designated as a bride, into the Nile every year in order to ensure its flooding, and in the holy place or Adytum of Serapis at Alexandria the heads of infants were preserved with the lips gilded. The fallahin are said still to bury untimely births in the corners of their houses. In Assyria, as a penalty for a breach of contract a son or daughter was burnt on an altar. The savage Assurnasir-pal's triumphant inscription boasts, "I burnt their boys and girls in the fire." The earliest prescription for child murder appears to be an Assyrian one (Gadd, 1946) of the 6th to 5th century B.C., that a human embryo was to be sacrificed to help glass making magically. The Bible (II Kings, xvii, 31) records of the people of Sippar, in Syria, who were planted in Palestine during the Babylonian captivity, that "the Sepharvites burnt their children in fire to Adramelech and Anammelech, the gods of Sepharvaim."

Of the predecessors of the Hebrews it is said (Deut. xii, 31), "Their sons and daughters have they burnt in the fire to their gods." (See also xviii, 10, and Leviticus xviii, 21.) The bones of newborn infants were found in jars in the High Place at Gezer (Macalister, 1912), as also were the skeletons of a youth and maiden sawn in two. Similar discoveries were found in or near the foundations of houses, and at Megiddo a girl had been slaughtered and built into a new foundation wall. The Arabs were stated by Pliny to slaughter children in order to procure baths of their blood for the treatment of leprosy, and they sacrificed boys to Dusares and the morning star. There is also the well-known incident of II Kings, iii, 27, mentioned by Josephus, in which Mesha, King of Moab, sacrificed his son on the wall to Chemosh, which struck terror into the victorious Israelites, who fled (Frazer, 1936). It is possible that the early Hebrews sacrificed their firstborn, in which case the story of Abraham and Isaac (Genesis xxii) may represent a turning point at which the practice ceased, though circumcision may be a relic. There were lapses, such as Jephthah's sacrifice of his daughter (Judges xi), which were condemned (Ps. cvi, 37-8; Jeremiah xix, 5, etc.). On these occasions it appears that the firstborn were burnt (Micah, vi, 7) as an atonement.

Hiel (I Kings xvi, 34) rebuilt Jericho upon two of his sons, constructing the foundations upon the eldest and the gates upon the youngest. In the Northern Kingdom (II Kings, xvii, 17) and the Southern under Ahaz (xvi, 3) and Manasseh

(xxi, 6) children were sacrificed by fire, and in the time of Jeremiah a special place, Ge Ben-Hinnom, had been dedicated to this rite. Frazer (1936) suggests that the tenth plague of Egypt (Exodus xi) is a later reversal of the facts, and that really the Israelites slew their own firstborn as a sacrifice. He also suggests that masked men went round slaying the Egyptian firstborn, and that the blood smeared on the lintels and side posts of the doors in order to distinguish the abodes of the Israelites is to be compared with the white scarves of the Catholics at the massacre of St. Bartholomew's Eve. Perhaps the facts would be better explained by an outbreak of undulant fever killing the embryo men and beasts and later altered to the tradition of the firstborn.

The Carthaginians annually sacrificed some of the freemen of the best families to Baal-Hammon; they were selected by lot. But later the families used to buy and bring up children whom they offered as substitutes. In times of disaster children were sacrificed to Saturn; e.g., in the fifth century B.C., Himilco, the Carthaginian general, tried to save his army from a plague by sacrificing a child. In 310 B.C., when besieged by the Greeks, the Carthaginians offered up 500 children, because they feared that the god was incensed by their frauds. The victims were placed in the statue's arms, whence they rolled into the fire.

King Aun of Sweden sacrificed a son to Odin every nine years in order to prolong his life (Frazer, 1936, *cf.* Mogk, 1913).

The practice of stabilizing a building by enclosing children in its foundations survived in dykes by the sea coast in Oldenburg up to the seventeenth century, and it is still symbolically represented in our foundation stones.

The Chippewa Red Indians, suffering from an epidemic, regarded it as a divine punishment for their wickedness. The most beautiful girl of the tribe was set adrift in the river and allowed to drown in order to stay the plague.

The Aztecs of Mexico (Prescott, 1888, 1) sacrificed and ate children on a large scale, and the same happened on a smaller scale in the Empire of the Incas (Prescott, 1888, 2).

Amongst the Australian tribes infanticide by exposure, choking with sand or knocking on the head is common (Porteus, 1931).

Numerous other examples of child murder are recorded by Frazer (1936), and also by Miller (1928), who, however, takes the view that this was usually a matter of convenience or economics.

In Britain it is reported (Wickwar, 1925) to have occurred as a sacrifice to the presiding devil of the coven in witchcraft. Only a century ago *The Times* (Saturday, 26 June, 1847) expressed alarm at the rapid growth of infanticide.

It may be urged that in most of the above examples the child is not actually killed by the parents, but such a widespread custom can hardly have developed without their co-operation, which must have resulted from a strong urge. In our own times murder of the child by the mother is only too common, and has called for special legislation, which was formerly savage (*cf.* Scott's *The Heart of Midlothian*), but is now more merciful in the Infanticide Acts of 1922 and 1938.

LITERATURE.

In Greek Mythology Medea kills her two sons as a revenge against her faithless husband, Jason, and this has been dramatized by Euripedes, who also wrote the *Mad Hercules*, in which the latter murders his children. Agamemnon sacrificed his daughter Iphigenia, the story being similar to that of Jephthah. Cronos ate his children, except Zeus, for whom a stone was substituted, this story being of Hittite origin. Atreus killed his son, Plisthenes. The Amazons were said to kill all their sons.

In drama only five examples of child murder were found. In Goethe's "Faust," published in 1790, Margaret kills her baby, but the deed is to some extent excused by Faust saying, at the beginning of Scene 25, that all her crime was a delusion. In W. B. Yeats's "On Baile's Strand," Cuchulain kills his son, though ignorant of his identity. In the play "Huis Clos," by the existentialist, J-P. Sartre, Estelle has drowned her illegitimate baby in a Swiss lake.

In Hugo's "Le Roi s'amuse," the jester Triboulet, having plotted the death of his daughter's lover, is the unwitting instrument of her murder when she assumes the lover's disguise.

Finally, in the "Punch and Judy" show every child is familiar with infanticide by the father, though this may not long be so if other authorities follow the lead of the Middlesex County Council Education Department (*The Times*, Tuesday, 10 June, 1947, p. 4), who refused to subsidize its performance in their parks, on the specious ground that it was not "educational," but possibly owing to their unconscious resistance to the theme.

Shakespeare does not use the theme of parental infanticide in any of his plays, but he recognizes its dramatic possibilities :

" I have given suck, and know
How tender 'tis to love the babe that milks me ;
I would while it was smiling in my face,
Have pluck'd my nipple from his boneless gums,
And dash'd the brains out, had I so sworn as you
Have done to this."

Macbeth, Act I, Scene 7, lines 54-59.

In opera (Kobbé, 1933), with its greater scope for melodrama, the theme is relatively more common. In Gounod's "Faust," Marguerite is condemned to death for killing her baby, and in Boïto's "Mefistofele" she is imprisoned for drowning it, both libretti being founded on Goethe's text. Verdi's "Rigoletto" is based on Hugo's play mentioned above.

In poetry Matthew Arnold has utilized the Iranian legend of Sohrab and Rostum, in which the latter, the Persian Hercules, unwittingly murders his son.

There does not appear to be an example in fiction, although Hetty Sorrel abandons her baby in George Eliot's novel *Adam Bede*. In general literature I do not include Swift's *Modest Proposal for Preventing the Children of Poor People in Ireland from being a Burden to their Parents*. This sarcasm is a curious reversal of the old custom of English parents selling their children to the Irish for slaves, until prohibited by Canute in 1017.

DISCUSSION.

The most famous and important complex is that described by Freud (1909), about 1900, as the "Oedipus complex," and named by him after the Greek myth and the tragedy "Oedipus Rex" by Sophocles (496-406 B.C.). In the case of women the corresponding Electra complex is so-called after the legend dramatized by Aeschylus (525-456 B.C.), Sophocles, and Euripides (480-405 B.C.). Although the phrase "Electra complex" was never accepted by Freud, who preferred to call it the female "Oedipus complex," it is remarkable how often in such cases the emotional attachment is to a dead father, corresponding to the dead Agamemnon, father of Electra.

This method of describing the deepest and most unwelcome impulses of the human spirit by a simple, if cryptic phrase has the advantage of euphemism, brevity, and the recognition of the penetrating insight of the Greeks. Indeed, Aeschylus seems to have exposed the root of such problems, ambivalence, in his phrase, "ἀπέρωτος ἔρως" (unloving love). As Money-Kyrle (1939) has pointed out, psychoanalysis has shed much light on Greek mythology. Mythology in its turn can clarify psycho-pathological problems. Freud (1936) pregnantly remarks, "I do not assert that the oedipus complex exhausts all the possible relations which may exist between parents and children."

Three possible explanations of the tenth plague of Egypt at the time of the Exodus have been given above, the survival of which story in its present form appears to be based on the Medea complex. A cognate matter which has long puzzled historians and shocked educated people is the repetition of the baseless accusation of ritual murder of Christian children by Jews in order to obtain their blood for the celebration of the Passover or anniversary of the Exodus from Egypt. A well-known example is that of Little Saint Hugh of Lincoln in Chaucer's *Prioress's Tale*. The last time this libel was published was by Julius Streicher in his periodical, *Der Stuermer*. As usual, the charge was a direct incitement to murder, followed by pogroms and massacres. These were specially aimed against the children, e.g., that of 17 June, 1942, when all the Jewish children in Paris were killed. In the light of the Medea complex the matter is clarified. The accusation is a projection of the accuser's desire for the death of his own offspring, and this death wish is later symbolically fulfilled by the murder of the victim's children. The same explanation holds for many other false accusations of cruelty to children, as well as for their actual ill-treatment.

It is significant that, although infanticide is so common in fact, it is rare in fiction. Even in the examples quoted it is often partially excused. Indeed the "Medea" itself was a failure when first published. Doubtless the reason is that the theme is too repugnant to our sentiments to be easily admitted to consciousness.

Fleeting death wishes against the children must occur in most parents — which of them has not at some time thought, or even said, "Oh, drat the child?" — but these wishes often remain unconscious, since there is a strong prejudice against their recognition, perhaps for fear that this would disrupt family life. It might be urged that in the case of a daughter this situation is merely one

aspect of the Electra complex, but Deutsch (1946) has pointed out that it is untrue that the girl's childish relationship to her mother ends up in hatred, and that in normal cases the attachment of daughter to mother is a lifelong one, quoting D. H. Lawrence's—

"A son's my son till he takes him a wife,
But my daughter's my daughter the whole of her life."

This is a salutary reminder that we must not over-estimate the strength or persistence of the Electra situation. Indeed Freud (1924) has stated that the Oedipus complex passes away at the end of the phallic stage of early childhood.

I have suggested that the complex described in this paper be called the Medea complex. It is true that Wittels (1933) has already described as the Medea complex the death wish of a mother towards her daughter, but thus used it is a misnomer, for Medea had no daughters.

If a separate name from Medea is needed for the like situation in a father and his offspring, I suggest the phrase "Atreus complex."

It is important that the true situation should be fully recognized by the psychiatrist, so that in dealing with the relations of parents and children it can be borne in mind, and the possibility of all degrees of covert or overt acts of hostility to the child can be considered, e.g. it is surprising how often a baby is weaned on such specious pleas as that the mother's milk did not suit him, i.e., it was poisoning him, the unconscious wish being father to the thought. In such cases too, a search should always be made for a conscious or unconscious hatred of the husband.

SUMMARY.

(1) The situation in which the mother harbours death wishes to her offspring, usually as a revenge against the father, is described and named the Medea complex.

(2) It is shown that there is considerable resistance against admitting these thoughts to the consciousness of the mother or any other person, but that they are of general occurrence.

(3) The Medea complex causes many marital difficulties, e.g., dyspareunia, prevention and interruption of pregnancy, failure of breast feeding, and other disordered domestic relations.

(4) It explains such matters as baby farming, disposal to others, and neglect of children, unjust accusations of cruelty to children such as blood libels, and acts of covert and overt cruelty to them.

I thank my friends, and in particular Dr. T. Wishart Davidson, for permission to quote Cases 1 and 5, Dr. W. Paterson Brown for Case 2, Mr. Richard Barnett of the British Museum for advice on archaeology, and my staff at Hatton for their constant help and interest.

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THE EFFECT OF LEUCOTOMY ON CREATIVE PERSONALITY.*

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IN some of our earliest investigations into the effect of leucotomy we used the Rorschach test, hoping thereby to obtain a fairly full and clear-cut picture of the personality changes produced by the operation, but it was found that this test had the disadvantage that, when repeated, memory of the previous test or tests to some extent minimizes the validity of the later interpretations.

The results obtained, however, did seem to indicate that leucotomized persons show somewhat less originality and creativity than normal people of the same age, social status and educational background. It was found, and I think our findings agree with others who have used this test, that although leucotomized patients are co-operative and quite unhampered by any nervousness, timidity or self-consciousness, they show no enthusiasm and make no great effort; their answers are usually given fairly quickly and briefly, and tend to be conventional responses evoked by large obvious details; they are content to give one or more of these, and then pass on to the next card. If they do not readily find anything they have no hesitation in putting the card down unanswered after quite a cursory examination of it. In cases where we were able to get a pre-operative record many of the post-operative responses are mere repetitions, rather more accurately described and with the more bizarre details omitted. Although human and human movement responses are introduced post-operatively they are relatively infrequent, and the majority of new answers are evoked by colour, or in some cases by texture, and are mainly conventional animals or objects. The introduction of new shading responses is relatively uncommon.

Later the individual test was supplemented by the Multiple Choice Method devised by Harrower-Erickson. In this, 30 answers divided into three groups of 10, are suggested for each card, and the subject is asked to underline one answer in each group. The answers have been selected from those commonly given by normal and abnormal subjects, and are according to the table given below:

SCORING VALUES OF MULTIPLE CHOICE RORSCHACH.

Explanation of Numerical Values Assigned to Answers in Terms of Rorschach Scoring.

1. Human movement responses (Rorschach's M).
2. Animal responses either with or without movement, including many "populars."
3. Good form answers given relatively frequently by unselected normals. In the coloured cards 3 stands for Form-Colour responses (FC).

* Read at the Quarterly Meeting of the R.M.P.A. held at Barnwood House, Gloucester, May, 1947.

4. Answer located in the small detail area of the card.
5. White space answers.
6. Anatomical answers with bad form (F-).
7. X-ray responses, clouds, and a few vague formless whole answers (leaf on card VI, animal skin on Card II, etc.).
8. Answer indicating an explosive response to Colour (CF or C answers).
9. Completely formless answers in uncoloured cards, including those indicative of unpleasant feeling tone in looking at the card (nightmare, etc.). In the coloured cards 9 stands for an evasion of the responses, or a mere statement of the colours on the blot.
10. Failure, the "nothing at all" answer.

Answers with scores between 1 and 5 are supposed to be those which occur most commonly in normal records and between 6 and 10 in abnormal records. Subjects with high scores in this test are, therefore, rated as being pathological.

Our results are here plotted in the form of a graph, comparing a group of leucotomized patients with a group of adult normals and a group of adolescents. In the leucotomized group the small number of human responses is noticeable, but the outstanding feature is the high proportion of the 9 and 10 responses; 9 seeming to indicate a literal but rather casual description of the blot, and 10 an inability or refusal to formulate anything. These findings, coupled with the clinical observation of a lack of initiative in some of the patients, and a tendency to live in the immediate present and to depend upon the immediate environment for stimulation, suggested that there might be a definite diminution of creative activity after the operation, and prompted us to investigate the matter more thoroughly.

Many trial experiments of different kinds were made, but at the present time we are more or less restricting ourselves to the use of two other tests in addition to the Rorschach. The first of these was introduced after we had experimented with the Thematic Apperception Test where the test is given in two sessions, in each of which the subject is given ten pictures and asked to invent a story about them, introducing what he thought was happening in the situation depicted by the picture, what events had led up to it, and what results would follow from it. We found that it took too long, and also in spite of all instructions people tended to describe the pictures rather than tell stories about them. The following eight sentences, therefore, were devised to use instead of the pictures. The subjects are asked to write eight stories introducing one sentence into each story.

1. I was sunk in the depths of misery; never had I felt so unhappy as I did at that moment.

2. The joy I felt at that moment is indescribable.

3. All right, I'll tell you about the most terrifying experience I have ever had.

4. There ended one of the most exciting adventures that any human being can ever have experienced.

5. It was the funniest story I have ever heard.

6. You have committed one of the worst crimes that any human being could commit.

7. It was the loveliest thing that had ever come my way.

8. Night after night I lay awake, eating my heart out with remorse, remembering what I had done.

We stress that it is a test of imagination and make it quite clear that we prefer an imaginary story, but if they cannot do this we will accept something they have seen or read, or a real experience of their own ; and we ask them to record at the end whether it is imaginary, remembered or autobiographical.

This test reveals considerable variation among normal subjects, some of whom experience great difficulty in doing it, and we have not yet sufficient comparable material to make any definite and dogmatic statement, but such evidence as we have suggests that on the whole leucotomized patients find it more difficult than normal, and in some cases we have almost been unable to get them to write at all. This inability does not appear to be due to lack of intelligence or education, and may be present in cases showing good social recovery. For example, one patient, who was operated on at Barnwood House for a severely incapacitating hypochondriasis, is now successfully holding his own as a French master in a Prep. School and working for a Degree, but he found the greatest difficulty in doing this test, and at the end of an hour had produced practically nothing. On the whole such stories as they do write tend to be brief and are either autobiographical or an account of something seen, read or heard.

The following two stories are interesting in that they exhibit this constriction of thought in an extreme degree :

1. " I am no Author or story-writer really, and on being asked to write something ' I was sunk in the depths of misery, never had I felt so unhappy as I did at that moment '."

2. " I have just finished No. 1 and must admit ' The joy I felt at that moment is indescribable '."

The second test is non-verbal but graphic. The complete test takes longer than was originally anticipated and so cannot always be given in its entirety. The following instructions given to the subject explain the nature of the test.

Drawing Test.

1. Write your name and underline it clearly.
2. Write 609 as neatly as you can.
3. Copy the drawing as exactly as possible.
4. Do you think this drawing could be improved in any way ? If so, draw it as you would prefer it.
5. Copy the painting as exactly as possible.
6. Do you think the painting could be improved in any way ? If so, paint it as you would prefer it.
7. Draw anything you like using six curved lines and twelve straight ones.
8. Choose one of the following : Joy, Anger, Sorrow, Fear—and then draw anything you like which will portray that emotion to you.

When given an entirely free hand and told to draw anything they like, leucotomized patients seem to have difficulty in thinking of anything to draw

and tend either to a literal reproduction of twelve straight and six curved lines, or else to copying some object in front of them.

When given a painting to copy the leucotomized patient often does better than the normal adult—his perceptive sense seems sharpened—it is, however, when he is asked to paint the picture as he would like it that his originality seems to be limited. He is asked to do a copy in the first place because it is important to have some idea of his technical and motor skill; manifestly these factors must be considered apart from his creative ability—his copy then acts as a control for his original painting.

As a preliminary canter, and to avoid our own bias, our first collection of 10 paired paintings was submitted to an independent arbiter for his assessment. He ranked them in decreasing order of creative ability shown, and it is interesting that the leucotomy paintings in this batch were ranked at the bottom of the group, with the exception of the very last which was the painting of an adolescent hemiplegic girl with an I.Q. of 49.

It seems that the leucotomized patient tends to stick to the same choice of colours, especially the purple; he seldom adds anything to the original picture, and often ignores the background. A sufficient number of these paintings has not yet been collected, so that these deductions are very tentative, but our collection is steadily growing from which more definite conclusions will emerge.

Since there does seem some indication that prefrontal leucotomy does diminish, even if it does not altogether abolish creative activity, we have been led to consider the nature of creative activity and its relation to the total personality.

By creative activity is here meant, that form of activity which results in the actualization or realization of some object or event which only comes into being because the creator, having first conceived it in his imagination, deliberately transforms his idea or vision into fact. The motives of such activity must be, as of course the motives of all activity are, emotional, and as such, associated with judgments of value on the part of the creator. In his imagination he conceives desirable objects or events which, had they a real existence, would satisfy his real needs, but which, while they have only an immaterial existence in his phantasy, tend merely to tantalize and stimulate impelling him to translate his ideas into facts. This, however, he can only do provided he has sufficient technical knowledge and practical ability, and the necessary persistence and sustained effort.

There are, therefore, at least four factors involved in creative activity:

- (1) Imagination.
- (2) Emotional motives and associated judgments of value.
- (3) Technical knowledge and practical ability.
- (4) Sustained effort and persistent application.

Is there any reason to suppose that leucotomy produces an alteration in one or more of these factors, which might account for any observed diminution of creative activity. Our own observations and those of others, indicate that there is no gross change in the last two factors. There are now many cases on record of patients who have successfully resumed jobs requiring considerable

technical knowledge, practical ability and sustained hard work. This leaves, therefore, the possibility of changes in imaginative ability, or in emotional motivation and associated judgments of value. For the present I propose to consider only whether the experimental results we have obtained might be due to a relative lack of imagination in persons who have been subjected to leucotomy.

Here it would seem necessary to define what one means by imagination, but in order to do so it is equally necessary to define what one means by its basic root, viz. image. In order to simplify matters the illustration is here confined to visual imagery and visual perception, but it must be remembered that all forms of sensory perception have corresponding sensory images.

In visual perception the stimulus, provided by free energy in the form of light rays reflected or emitted from some physical entity, detonates as it were the potential energy stored in the receptors of the retina, and initiates a wave of biophysical and biochemical activity in certain nerve-fibres and their neurons in the cerebral cortex; and this is accompanied by the subjective perception of an object, which appears to be placed at the site whence the light rays, which cause this train of events are reflected or emitted.

In the case of a visual image the subjective experience is again of an object situated in space at the same site as in the perception, and this experience is also accompanied by biophysical and biochemical activity in the corresponding nervous pathways. The subjective experience and the concomitant neurological activity though similar are not normally identical, and the image is distinguishable from the percept. This is important because in the case of the image the free energy or stimulus which is necessary to bring about the requisite biological activity is not provided by light rays emanating from the site at which the imaged object appears to be situated, but is derived from some other source. This is made possible by the tendency of the cerebral cortex, under certain conditions to fuse into one composite whole two originally discrete patterns of neuronal activity initiated by free energy from two different sources, with the result that finally the presentation of only one stimulus evokes activity in the whole configuration. The subjective counterpart of this fusion is the emergence of the image; the presentation of one stimulus not only evokes the perception corresponding to it, but also the image of that other perceptual experience which formerly accompanied it. (The study of the conditioned reflex has thrown much light upon the conditions which govern the fusion of the two separate stimuli into one organized whole.)

The image is thus a fainter copy of an original percept, and is aroused by events which were associated with it. It is, therefore, the physiological basis of memory and the more accurate the memory the more exactly the image reproduces the original percept. To paraphrase Leibnitz, "There is nothing in the image that was not first in the percept"; and so long as imagery is used only for the purpose of remembering the objects and events of the imaged world, they correspond to those the Lady of Shalott saw in her mirror, and are but copies of the perceptual world, and their order and their relations are exactly the same as those of that world." (Any reference to illusions and errors is here deliberately omitted.)

This relationship between the imaged and the perceptual world no longer holds good when we turn from memory to imagination, for here we find objects and events that have no counterpart in the world we perceive, but are purely imaginary and fantastic. Now this originality of the imaginary world is more apparent than real, for on careful investigation it will be seen that the entirely new objects and events which exist in the world of imagination are constructed out of parts which are derived from the world we perceive. Even in imagination there is nothing in the image which was not first in the percept, the only difference is that images of perceived parts are re-organized and re-integrated into new imaginary wholes, but it is only the re-organization which is novel.

Nevertheless I believe it is true to say that this re-organization of images derived from percepts is the essential basis of man's creative activity, and further that it is dependent upon language ; only man has representative language, and there seems good reason to suppose that the proximity of the speech area to that controlling the motor activity of the dominant hand is not purely accidental.

With the introduction of representative language a speaker can by *his own activity* produce the stimulus necessary for the evocation of an image. For example, since normally the physical phenomena responsible for the visual perception of a dog and the auditory perception of its bark fulfil the conditions necessary for fusion the presentation of one stimulus is capable of evoking the image of the percept normally caused by the other. If a man deliberately copies a dog's bark, this sound will serve instead of the animal's bark and will be capable of arousing the image of a dog in the hearer. No longer is man dependent upon immediately given stimuli in his environment to provoke imagery and re-awaken memory, he is able to do this by means of his own activity ; he can do it at will. By means of the representative function of language he can translate his own percepts and images into sounds or gestures whereby he can arouse corresponding images and percepts in others ; his word whether gestural, spoken or written serving as the physical stimulus which arouses the image in the hearer.

This is important from the point of view of memory, but language serves yet another function in imagination, for words may be combined by the speaker in ways in which the natural phenomena which they represent cannot, with the result that the images which they evoke will be of objects and events that have no counterpart in the world which we perceive ; by means of language a world can be imagined in which cats play fiddles, cows jump over the moon, and dishes run away with spoons. Cats, fiddles, cows, the moon, dishes, spoons, playing, running and jumping, all are derived from the world of perception whence they are translated by language into a world of phantasy.

Now although language can construct purely imaginary objects and events, man by no means necessarily uses it this way. None the less the child's development and evident enjoyment of pure phantasy suggests that it does satisfy some emotional need, and is probably essential for the full development of man's genuine creative activity.

The objects and events which man perceives in the world around him have gradually been observed by him to behave in certain ways which he has formu-

lated as natural laws. The imaginary objects and events which he has constructed by means of his language do not necessarily so behave, but may do so. These latter objects and events are still imaginary in that they exist only in man's imagination, but man may by his re-organization of those parts in the real world whence his images are derived, in conformity with his re-organization of them in his imagination, create new objects and new events in that *real* world which we perceive, objects and events which would never have happened had not man first imagined them and then brought them into being. This is true creative activity and it is dependent upon keen observation and accurate knowledge concerning the nature and behaviour of objects and events in the perceptual world, upon the ability to re-organize these imaginatively into a new and desirable whole, and then by effort and practical ability to translate the imagined concept into reality.

In the case of the leucotomized patient his command of language seems as good as ever, his imagery and memory appear unimpaired, his perception of his environment if anything rather keener than it was before, his knowledge and intelligence and practical ability unaltered and in many cases his diligence and industry show little or no diminution. Is there, however, any reduction of that activity by means of which man constructs out of the world he knows, another and a better world, an ideal world which only exists in imagination, but which, if it did exist in reality, would be a more satisfactory world than the real one in which he lives.

If leucotomized patients do, in fact, cease to exercise this creative activity is it because a section of the prefrontal fibres has destroyed the power to do so, or has it merely in some way dissociated the emotional factors which in normal persons motivate such activity?

This is the problem on which we are hoping to throw light by our experimental investigations.

The absence of such creative activity might account for some of the behavioural changes that have been noted in these patients, particularly their tendency to live in the present and their freedom from anxiety and the sense of moral obligation. For while the present exists in perception and the past exists in memory, the future exists in man's imagination, being imaginatively constructed by him out of his experience of present and past. And whatever may be one's views about absolute values, it is surely true to say that man's ideals also exist in his imagination, and that moral obligation consists in the necessity to translate the ideal into the real. If, as the result of the operation, these patients are either unable or have no emotional urge to imagine a possible future or an ideal standard of what ought to be, they will naturally be freed from anxiety concerning what might happen and from the sense of guilt and remorse which the ordinary person has when he thinks on "those things he has done which he ought not to have done, and those things he has not done which he ought to have done."

A CASE STUDY.

By M. BASSETT, Dipl.Soc.Sc.,

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Up to the present the investigations carried out at the Burden Neurological Institute into the effect of leucotomy on the creative personality have been somewhat limited since few of our patients had shown any real evidence of a creative urge prior to the operation, and this has been a very great drawback. The use of story-telling and painting tests seemed to show certain differences between leucotomized patients and normal people which were felt to be due to an absence of creative imagination, but it was impossible to be sure that this difference was the result of the operation, or that these people had in fact ever translated their creative spirit into creative action before they became ill (1). It has been of very great interest, therefore, to watch the effect of the operation on a patient at Barnwood House, who, prior to her illness, gave tangible evidence of this spirit in the shape of poems, prose and other dramatic work.

X— is a young woman, aged 32, a Hungarian by birth; she was brought up very strictly, and has undoubtedly been neurotic and obsessional since adolescence and possibly even earlier. Her first breakdown occurred when she was 16, shortly after she went to live in another mid-European country. As far as can be gathered the cause of the breakdown was attributed to overwork; but there is also evidence to show that parental conflict was also a potent factor. Her father was domineering and puritanical, and strongly disapproved of women taking part in any activities outside the home, and it was very much against his wishes that she studied at high school, or went to ballet classes. She had very little freedom—at the age of 17, for instance, she was not allowed to go to the cinema, unless accompanied by both parents, and it was insisted that she sit between them throughout the performance for fear of molestation! Her mother, on the other hand, tried to restore the balance, and one suspects that she was over-lenient and arranged for the girl to undertake various activities in defiance of father, and often unknown to him. This account of the patient's history is no doubt biased, as it was only possible to obtain information from mother and patient, but undoubtedly much conflict existed, and at the present time the parents are separated.

X— is described by her mother as having been a very shy, highly imaginative child, who never seemed to want a lot of friends. X— herself says that as far back as she can remember she wanted to write books and plays, and that as a child she often composed poetry; she thought her desire to write was partly the wish to do as other members of her family had done, especially her father and cousin. I think it must be emphasized that her urge to write was probably motivated by defiance of, and identification with, her father as well as an urge to express herself in creative work.

Since coming to England in 1938 she has written many poems, some of which have been published and broadcast, and she had already started on a book and a play, when in March, 1947, she finally became so preoccupied with her phobias and obsessions that she was unable to work any more. The following poems are example of her work:

"Du Sprachst Von Deiner Heimat.

" Aus : Blumen fur Zdislaw.

*" Du sprachst von deiner Heimat leise
An mich gebettet wie ein Kind
Ich lauschte der und, ernst, der Weise
Die draussen Stöhnend sang der Wind.*

*" Die Nacht hielt sanft die dunkeln Arme
Die duftend sie auf mir gesenkt
Und wie ein Licht trug ich die warme
Rotnelke, die du mir geschenkt."*

"Weinbergsschnecke (1942)

- " Das dünne Haus glantz wie ein Ohrgehänge
Aus hellem Gold. Aus seinem Innern, sacht,
Schraubt sich die Schnecke wie aus einem Schacht
Und streckt sich, gelblich, gänzlich in die Länge.
- " Die anmutvollen Fühler, zag entfacht,
Erspähen wie in Staunen das Gedrange,
Der dürrn Tannennadeln, deren Menge
Den Waldgrund polstert, tief wie eine Nacht.
- " Das Kriechtier gleitet auf dem feinen Holze
Mit Sicherheit und jenem zarten Stolz,
Mit dem ein kleiner Kahn vorüberzieht . . .
- " Die Sterne, die verstreuten Silberkörner,
Tanzen ihm einen Lichtkranz um die Hörner,
Den es in seiner Augen Spiegel sieht."

It seems certain that before leucotomy she did strive to express herself in creative work, and that she did in some measure achieve recognition that some of her poems were worth while. It could be said, of course, that she was driven by the urge to emulate or outdo her father quite beyond her capacity, and that her mental illness, and finally her willingness to undergo leucotomy, provided a method of escape from this powerful drive. Nevertheless, it must not be forgotten that in spite of her difficulties, and maybe in spite of a limited capacity, she did produce some work of a fairly high standard.

From March, 1947, onwards the patient gradually became more and more pre-occupied with her phobias and could not go upstairs, nor go out, nor be alone; and having reached the stage when life had become unbearable both for herself and for those around her, and having made no progress either by psychoanalysis (which she broke off on two occasions) or other treatment, she finally decided to have the operation of prefrontal leucotomy. This was performed on 16 August, 1947; the patient's recovery was uneventful and was accompanied by many of the usual post-operative sequelae; she was slow at first, stayed in her bath until the water became cold, had to be prodded to dress or move, and was incontinent occasionally during the first five weeks; with regard to this latter she first expressed no interest, but later she became conventionally "ashamed of myself"—but she showed no feeling of shame or embarrassment, and appeared to be rather amused about it. She complained of ravenous hunger, and said that at first she was so hungry that she had to rush into the dining room and start eating right away—she could never have enough to eat. After the seventh week she said she was still hungry, but her desire for food was not so compelling, and she hoped she would never feel like that again.

The tests described in the earlier paper (1) were given to this patient after the operation, unfortunately they could not be given pre-operatively, and before setting down the results of these tests I would like to quote Hutton's definition of creative activity.

"I would define creative activity as that form of activity which results in the actualization or realization of some object or event which only comes into being because the creator having first conceived it in his imagination, deliberately transforms his idea or vision into fact. The motives of such activity must be, as of course the motives of all activity are, emotional, and as such, associated with judgments of value on the part of the creator. In his imagination he conceives desirable objects or events, which had they real existence would satisfy his real needs, but which while they have only an immaterial existence in his phantasy, tend merely to tantalize and stimulate, impelling him to translate his ideas into facts. This, however, he can only do provided he has sufficient technical knowledge and practical ability, and the necessary persistence and sustained effort.

"There are therefore at least four factors involved in creative activity:

- " (1) Imagination.
- " (2) Emotional motives and associated judgments of value.
- " (3) Technical knowledge and practical ability.
- " (4) Sustained effort and persistent application."

TEST NO. 1.

Harrower-Erickson Multiple Choice Rorschach.

This graph follows quite closely the type of graph we have come to expect from our leucotomized patients, i.e. a high percentage of 9 and 10 responses indicative of poverty of association and refusal or inability to formulate anything.

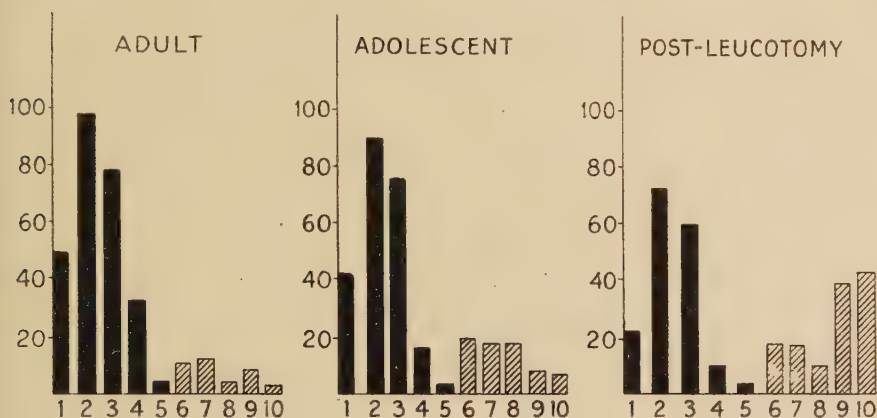


FIG. 1.—Harrower-Erickson Multiple Choice Rorschach. Group results.

TEST NO. 2.

Story Telling.

The patient is strongly urged to "make-up" a story, but the results are extremely limited, especially for one whose profession is a writer—in addition the stories are all "true."

It was also suggested to the patient that she should write around these sentences, using not English, but German, but this she declined to do, saying that language made no difference, and that she would write exactly the same in German.

(1) I was sunk in the depths of misery ; never had I felt so unhappy as I did at that moment.

"When my fiance was killed, I was sunk in the depths of misery ; never had I felt so unhappy as I did at that moment."

(2) The joy I felt at that moment is indescribable.

"When my fiance arrived unexpectedly, the joy I felt at that moment is indescribable."

(3) All right I'll tell you about the most terrifying experience I have ever had.

"All right, I'll tell you about the most terrifying experience I have ever had ; when I was a small child, the restaurant at the 'Black Sea' caught fire. . . . My mother got terribly frightened . . . and so on . . ."

(4) There ended one of the most exciting adventures that any human being can ever have experienced.

"There ended one of the most exciting adventures that any human being can ever have experienced ; I saw them *all* fully drunk . . ."

(5) It was the funniest story I have ever heard.

"It was the funniest story I have ever heard M'selle, you have lovely eyes . . . yes . . . especially your left one . . ."

(6) You have committed one of the worst crimes that any human being could commit.

"Miss L— you have committed one of the worst crimes that any human being could commit."

(7) It was the loveliest thing that had ever come my way.

"When I first met my (late) fiance . . . it was the loveliest thing that had ever come my way."

(8) Night after night I lay awake, eating my heart out with remorse remembering what I had done.

"Night after night I lay awake, eating my heart out with remorse remembering what I had done. . . . Alas, I did, and for something which was not even . . . bad."

"It is all true."



FIG. 2.—Drawings utilising 12 straight lines and 6 curved lines. Normal group.

TEST No. 3.

Line Drawings.

Four weeks after leucotomy the patient was asked to make a drawing, using 12 straight lines and 6 curved lines. She sketched quickly a headless nude without any relation to the number of lines required. This drawing can, of course, be interpreted as a projection of her ideas concerning herself, i.e. her preoccupation with her body and her sense of loss associated with her "head." It is interesting that here she made no attempt to utilize the required number of lines.

Six weeks after leucotomy the patient was asked to do the same test—the results can be seen below, and again they are very typical of the leucotomized patient's efforts. (a) In a first attempt she says, while drawing, "I know I am

being naughty," which I interpreted as "I could do better if I liked." (b) It was then insisted that she make another effort to combine the lines and curves into a picture, and this resulted in her drawing "mountains and trees"—the lines and curves are scarcely different from (a) and there is still no evidence of any ability to integrate the discrete parts.

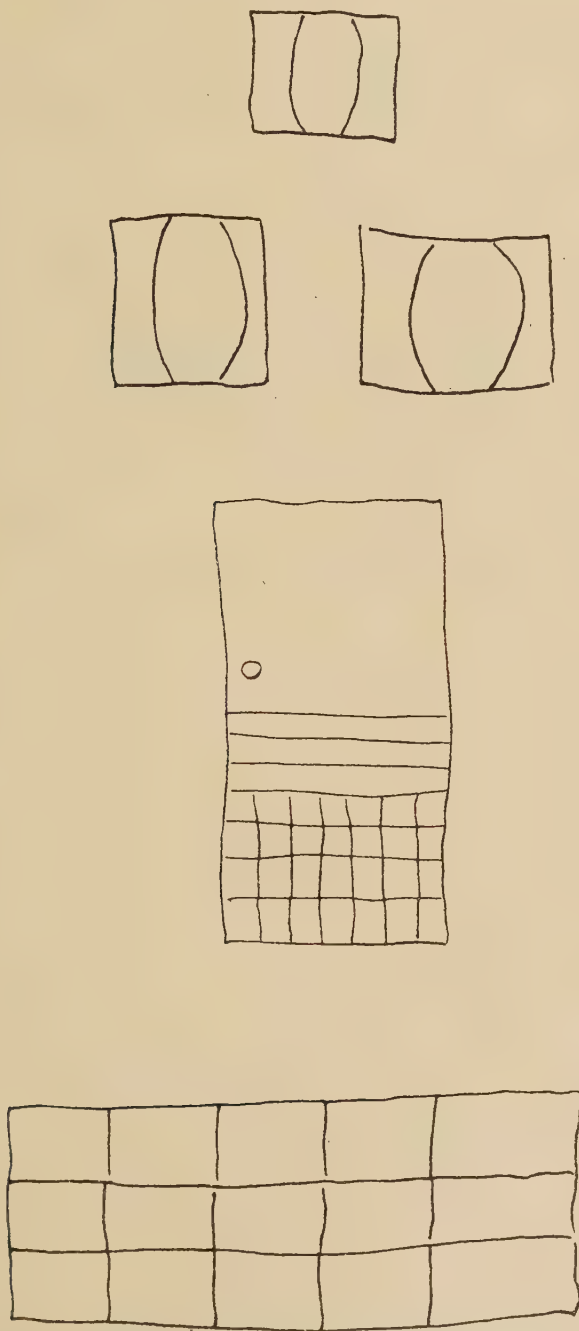


FIG. 3.—Drawings utilising 12 straight lines and 6 curved lines. Post-leucotomy group.

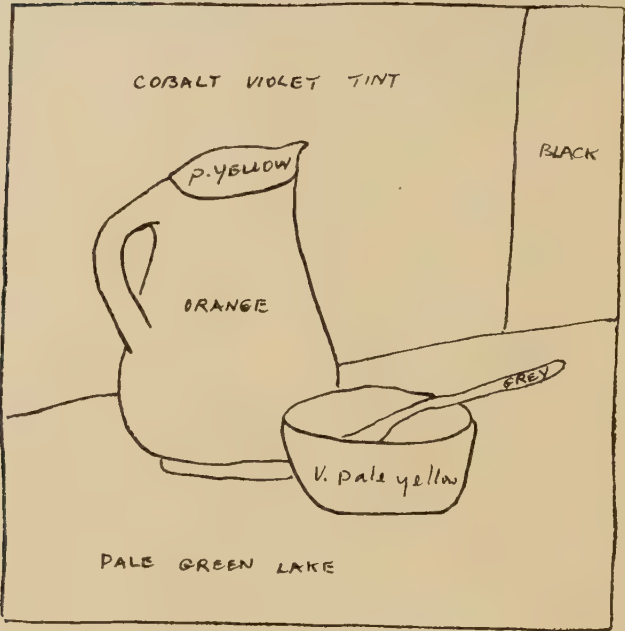


FIG. 4a.—Coloured model to be copied as exactly as possible.



FIG. 4b.—Blank model for 'improvement.'

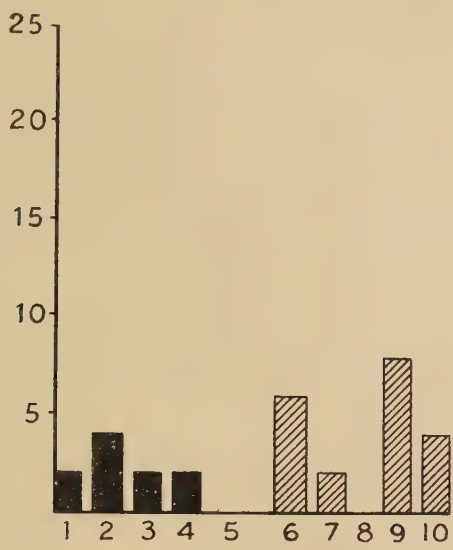


FIG. 5.—Harrower-Erickson Multiple Choice Rorschach. Post-leucotomy. Miss X.

(a)



(b)



Fig. 6.—Drawings utilising 12 straight lines and 6 curved lines. Post-leucotomy. Miss X.

TEST No. 4.

Drawing and Painting Test.

Four weeks post-leucotomy the patient was given the drawing "Jug and Bowl" to copy—this she did, enlarging the size of her reproduction considerably. Her "Improvement" to this drawing was the addition of some shading and some "stripes" to the curtain. Unlike many of our "leucotomy" paintings, this patient did not copy the painting well—she did not bother to get the exact shade of colour, nor did she trouble much about the application of the paint. Her "improvement" of the painting was again the addition of shading and the stripes to the curtain—otherwise she did not paint the picture but merely outlined the objects in the same colour as the stripes. A few faint marks were put in the background, which she said could be wallpaper, but she made no effort to complete the design.

Up to the present this leucotomy painting differs from most of the other leucotomy paintings which we have collected—there is application of shading and a complete break away from the original colour scheme. Nevertheless her "improvement" of both the drawing and painting is very limited and does not go beyond the addition of shading and striping the curtain. Incidentally she is the first of our leucotomized patients to have studied drawing and painting in adult life—though as she says, she found she was no good at it, and finally gave it up.

In addition to these tests, a full scale Rorschach Test was given on two occasions before the Rorschach Multiple Choice Test. The Rorschach showed much perseveration and limitation of ideas. Several of the Thematic Apperception Test pictures were also given the patient, and again the constriction of thought is very obvious.

It is interesting that in her responses to the Raven Projection Test the patient each time refers either to a film she has seen, a book she has read, or to herself, and to her recent activity of "painting a vase" (Test No. 4). The patient's responses to these tests are printed so that the reader may himself see the constriction of thought, poverty of association and literalness of the material.

The Raven Matrices was given on two occasions, namely 4 and 8 weeks after leucotomy—and the second occasion showed a marked improvement from a score of 29 to a score of 43, which could be considered average.

The Shipley-Hartford scale for mental deterioration showed a Conceptual Quotient of 124, which is well above any pathological level.

ADDITIONAL TESTS.

Rorschach.—Four weeks' after leucotomy.

- I. (1) Looks like an inner organ, I don't know—yes that could be the bit of a spine—is it anything?—better like this—that's all I can say.
- II. (1) Oh that—I don't know—rather funny with the red—do they all have red, I don't know—I can't think of anything—yes I think from the beginning that that looks like a woman's organ—a little—and of the red—couldn't be a little bit like menstruation—I don't like the word.
- III. (1) Oh, this is rather funny—this ink too, I've got no imagination any more since the operation. Like two people here facing each other—what the red is I don't know—I feel tired already—these look like feet—I didn't use to feel tired—these two people are cut off in the middle—that's all I can say I don't know what these red are—these are 2 men exactly the same I don't like men they are old.
- IV. (1) I don't like it I got used to the red now and suddenly all so black—first of all so black, and then I get used to 3 colours.
- V. (1) That's not nice either—just a pair of the other thing—I'm afraid that's all I have to say.
- VI. (1) Well they all remind me of anatomy, different organs—kidneys, I always say kidneys. I like to eat them—very easy, sexual intercourse—I suppose people think of other things—I don't know what to do with these things.
- VII. (1) This is rather funny, not nice, I don't know what it looks like.

- VIII. (1) Gosh, that has rather a lot of colours, rather nice, a pair of animals, and that I don't know, and that I don't know, is it always my imagination that reminds me of sexual things or only me? they are mice—ugh—what are these animals doing here?—could be a child—then I turned it this way and it looked like mice.
- IX. (1) I wanted to laugh, I don't know why consciously silly stuff I think—but possibly I'm right—I said sexual organs over most of them.
- X. (1) Oh that's complicated, are these crabs here, this could be dogs, two animals here, don't know what they are called—if I had seen these things before I could have told you lots of things, perhaps I'm lazy, I don't know, each of them could be likened to an animal—snakes there.

ADDITIONAL TESTS.

Raven Projection.—6 weeks after leucotomy.

The Road.—To Hell—to the Infernal—where I want to go—much more fun there than in Heaven. It's very hot—not burning hot—summer frock heat—a lot of dancing—I'm thinking of a film I saw many years ago—beautiful girls dancing around—things out of Greek mythology (what happens there). You don't need to worry very much (what like about it) the feeling of leisure—I'm tired of being with good people—you can relax—no one is going to tell you to get out of bed—I shall stay in bed for the first few days after getting out of here.

(Dislike about Hell?) Might be too hot.

(What do about it.) Go and have a cold shower in a beautiful garden on the outside of Hell.

The Box.—First thing I thought of—the bride—my Mother read the story to me some time—there's something terrible about this box—why made—well it was made for things not for brides—winter clothes. Just to puts lots of things in historical things—it never occurred to me that it could irritate the owner—perhaps I am the owner—I think of the bride again—perhaps he couldn't open it—anything might happen—I don't know who the owner is—he wouldn't be irritated by the box.

The Girl.—(What imagine she is doing.) She's painting a vase (patient had done painting test previous week)—I notice her lashes, long lashes (what interested in.) She looks rather the school type—might be a photo of myself looking like that. Her eyes again attract attention—she's very scholastic. (what thinking) How can I get out of my school uniform and be less schoolish (what is her real work) She's sportish I think—I've never been sportish. (patient sits facing a tennis racquet and balls.) She seems the type who likes precise things—unartistic, practical, quick, lively—just the type I am not. (what dislike) I'm afraid I can't think of anything—she likes what she's doing—she's got lovely lashes—she's not artistic. (Who will see her work) her room or class? if in her room—nobody—or the maid. coming in with her coffee—I've just finished coffee when you came—or the tutor. (what will they think) that she will bother and when she starts will go on till she has finished—will do her best—not like me—she's a good worker. (what will she think) that she tried her best—that it could be better—but she's satisfied—she might really write . . . (what sort of people does she like) sporty people—practical, lively, different from her (what company does she prefer) men's—(what sort of company dislike) dreamy people . . . she looks so practical that I can't take her out of this . . . (what annoys her and makes her angry) contradiction—I don't like it—nobody likes it (in what way) if she does this or that people telling her that she's done too much, or not enough, or something . . . I've had so much of it. (what does she do when angry) then she contradicts even more—she doesn't keep it in as I would—she's not a neurotic—she plays a game, and forgets it. (what frightens her) Nothing—she's not a neurotic—well—a landmine perhaps, (when she gets tired, what worries her) she's not worried—she is lying down and resting. (She sees or hears something funny) an army joke (what sort) silly . . . not daring . . . (what does she enjoy most) games, dancing, ballroom dancing, men (She dreams she gets what she wants)—long sports socks (given a £1,000) I don't know what she would do, she's so different from me . . . or she is what I would like to be . . . a part of me looked like this at 15 . . . it's died out now . . . she'd start a business, sport or needlework, she would

do something with it . . . I would dream . . . she might be all that I am not (wakes and finds she's been dreaming) This girl doesn't dream, does she ? . . . doesn't worry too much about it . . . says, I've dreamt, that's all (Is she satisfied with things as they are) As much as a person like that can be . . . takes things for granted . . . I feel life is terribly senseless (aim) first to finish her girl's game—her real life's aim is to get something useful and to do it well . . . she sets about it quickly and energetically—she will make a good nurse or tutor. (What do you like about the person you have described) her lashes—and she's so determined . . . if she ordered herself to get out of bed she would . . . not like me. I feel so lost and that I shall fall out of bedroom window (patient has lately moved upstairs by herself) (what dislike about her) She's too broad in the back a bit heavy in the chest . . . but rather nice . . . not the type who would ask what sense there was in life . . . deep down I wanted to die after the operation . . . I hoped perhaps it was more serious than it really was . . . I also want a man that I am in love with. . . . I've a nice boy-friend . . . but I'm not in love with him . . . if little things were different, perhaps, for instance, I was a little hurt. . . . he did not like the way I kiss . . . he told me very nicely . . . (what do you think of your description) must repeat . . . she is all that I am not . . . everything opposite to what I am.

So far, then, the material gained from the various tests does show us a great limitation in imaginative thought. What is more interesting, however, is the patient's own spontaneous ideas concerning this aspect of her personality. The following are extracts from her conversation, and these suggest that she feels a sense of loss :

- 3 weeks after leucotomy . (What about your writing ?) " Later on at present since the operation, I feel I've no imagination, but I am sure it will come back again."
- 4 weeks after leucotomy . " I've no imagination any more since the operation—during Rorschach test if I had seen these things before I could have told you a lot of things—perhaps I am lazy—I don't know."
- " Is it always my imagination that I see sexual things, or is it only me."
- Passing the hall table on . " They can't be for me of course, because I'm no which are a pile of longer here (patient had moved to another part of letters hospital) " I don't get many letters now, at one time I used to have a lot of letters " (Do you write many now ?) " No—and if I do—2 pages, why and I am stuck—but never mind, it will come back—or even if it doesn't it won't matter."
- Apropos of the story tell- . " In everything I have to create I have to be left quite ing test free. I must not be forced in any way—at school I often found it difficult to write essays." (What about now—how do you feel about your writing ?) " It might take some time—I might change my style—I think it will come—in my worst times sometimes I used to write some things—it was always a refuge—I turned very much to writing when the boy I loved was killed . . . I shall work more . . . at something heavier—so that I can reach one good piece of work, although Rilke, who is the poet for me, never reached Shakespeare or Goethe. I have lived so much in my work, that if I could write something really good, which I think good, I would think, this is what I have lived for. I feel a little more friendly towards work now—I've felt a little more these days. Why I really thought I wouldn't be able to work is that I connect that
- 4 weeks after leucotomy

- electric feeling with my emotions—and then if I don't get that feeling any more . . . but that is perhaps a stupid idea. . . .
- 5 weeks after leucotomy . . . "Everything is different—before I had 2 fears—one was the real fear of being alone and going upstairs, and the other the fear of being afraid and making a fool of myself—now I am remembering, the fear rather than feeling it."
- (How do you feel since your operation ?)
- After walking through the gardens of the hospital "I feel pleased that to-day I made the journey alone—though when I passed the gate leading to the open road I felt a little bit strange." (One of her phobias that of throwing herself under a bus.) "But it soon passed and I did not get that 'electric shock' (What do you mean ?) "The sort of feeling which I used to get starting in my head and going all over my body—now I wonder if I did not experience that 'electric shock' whether I shall ever feel the same about my creative work—I wonder if something has been lost—I would hate to think so—it would not be worth it—I was told beforehand about a violinist who had the operation and who is now playing better than she ever did—well, I understand that of course, if she is less tense she can let herself go more, but it is not quite the same as composing, which is something which you make up yourself."
- 6 weeks after leucotomy . . . "I'm rather better with reading now, but it's my lack of feeling about my work that does worry me occasionally—*when* I remember it."
- Apropos of drink . . . "I react quickly to alcohol—I'm afraid of drink—I'm afraid to let myself go—I don't know how I'll be now, but I don't really like it. It's unaesthetic to be drunk."
- Apropos of the operation "Afterwards I took in little details of the window, if flowers or patterns on the eiderdown or screen I would count them—follow the lines—I was quite obsessed by it, but it didn't worry me and I asked myself—what kind of a game are you playing."
- Apropos of dreams . . . "I had some rather bad nights, and then for two or three nights I kept waking up after dreams—but I didn't get the same feeling."
- 9 weeks after leucotomy . . . "I forget sometimes that I work—but now it means nothing to me—very far away as if it meant nothing to me."
- Apropos of work . . . "I wonder if a man like Rilke—if he had had an operation like I have—would have gone on writing—or whether the finer emotions would have gone—I don't think the operation of appendix gave me the same feeling—*really*—I *have* no feelings—I did not realize I was so far away from life then as I do now—as if in a cloud." (Do you feel far away now ?) "I am slowly coming back now. Letters from my boy now. When I read them they left me cold—now, when I read them again, I can't think why they left me cold." (Do you feel more about them now ?) "Well it was more the realization that he had taken the trouble to do it—he is not really a letter writer."
- 9 weeks after leucotomy . . . "I hope I am still going to be an artist—but perhaps if I haven't the wish to do it, it won't be such a loss—it's better that it went since March and not with the operation." (Patient had said before that she felt something towards her work even in her worst times.) "I would still like to find out what had caused me
- 9 weeks after leucotomy

this relapse in March." (Do you find it difficult to write ?) "I did find it hard to write, and I know it did not come without effort, but even great writers have experienced that—Thomas Mann, the writer, had great difficulty in writing, yet he wrote a lot."

I think it is possible that we may have underestimated the cost of creative work to this personality. Nevertheless, assuming that this is great, no obsession phobia or physical illness prevented her from producing *some* work of a fairly high standard and it remains to be seen whether leucotomy is also an "also ran."

SUMMARY.

Following observations made on previously leucotomized patients who seemed to be lacking in creative ability, a detailed study has been made of a patient who, prior to the operation, had shown real evidence of creativity.

1. The study is so far limited to a period of nine weeks after leucotomy.
2. Evidence so far gathered suggests that :
 1. Creative imagination is much reduced and almost non-existent.
 2. Emotional motives and associated judgments of value are not apparent.
 3. There is some decrease in effort and application.

The salient feature of this study is the patient's intellectual appreciation of these deficiencies.

CONCLUSION.

Up to the present it would seem that the effect of leucotomy has been to eliminate the "creative spirit" from this personality. It remains to be seen whether this is one of the lasting effects of the operation, or whether it is merely a temporary effacement, and whether in time, a spontaneous resumption of creative activity will take place, and if so, on what level.

Thanks are due to Dr. M. Harrower for permission to use her Expanded Multiple Choice Rorschach Test.

THE MENTAL HEALTH OF BRITISH TROOPS IN THE FAR EAST.*

By R. F. TREDGOLD, M.D., D.P.M.

REASONS FOR CHOICE OF STUDY.

THE general importance of studying the mental health of British troops in the Far East is obvious enough. It is perhaps less obvious that this importance is unlikely to have diminished with the end of the war ; for there are still many troops serving in the Far East, and presumably will be for some time.

Some information of the factors likely to affect them may be obtained by studying soldiers in base areas in wartime. In doing so, it becomes evident that the latter have in any case received less attention than they deserve, even if it were only a question of their immediate influence. Most writers have been concerned first and foremost with soldiers in the front line. This is natural enough, for the soldier's first duty is to fight, and the greatest stress he has to undergo is widely considered to be that of enemy action. The psychological problems in base areas have, therefore, seemed a secondary matter—whether they are those of the general or the private.

But on reflection it may be seen that base areas deserve at least as much study as forward—perhaps more. This is because the more technical war becomes, the greater is the number of men needed behind the lines. Each fighter pilot, each submariner, each tank trooper, needs many men behind him to keep his weapons in his hand. Even the modern infantryman needs several men—in uniform or overalls. It is their failure which may cost him his life or the army defeat. This may occur either directly, by an actual shortage of equipment, or indirectly, by an effect on morale. A drop in the morale of base workers results in strikes, political squabbles, profiteering or immorality ; all of these have their repercussions on the soldier at the front. At the least, they distract his attention so that he has to fight looking over his shoulder. At the most they deprive him of confidence in his countrymen—leaders, comrades or family—and thus lower both his war aims and his sense of security. Both of these are cardinal. The health of everyone in the chain of supply, whether soldier or civilian, is thus inextricably bound up with the morale and efficiency of an Army in the field.

Soldiers in base areas overseas obviously constitute a link in the chain. A study of their mental health is, therefore, of direct military value in war ; and it may provide information about problems of the peacetime army overseas. Finally, it may contribute to our knowledge of group behaviour, and perhaps even suggest remedies for some social problems.

It is realized that some time must elapse after a war before its lessons in

* A portion of a thesis accepted for the degree of M.D. at the University of Cambridge.

medicine can be fully digested. The report of the War Office Enquiry on Shellshock (1922) showed that this was so after 1918 ; it also showed that there were some dangers in delay—for instance by the spread of the very term shellshock—and that accounts published moderately early were valuable both because they were a basis for discussion, and because memory was fresher. It is, therefore, considered permissible at this time to submit the observations made during the course of 1943-45.

As the First World War provided much information about the effects of one particular stress on the human mind (that is, battle), so it may be that the second will enlarge our knowledge of other stresses—in particular the less spectacular domestic and personal problems of the individual.

OUTLINE OF WORK.

The original work was planned on the following lines of approach :

(1) A study of examples of the gross failures of mental health. This is, of course, a method always to the hand of the psychiatrist. Those failures are his clinical cases, and the factors which produce them are worth detailed investigation.

(2) A study of examples of minor failures of mental health. These are men who do not report sick, but are nevertheless not in perfect mental health, happiness or efficiency. It is probable that they are far more numerous than the frank breakdowns. They are not always seen by the hospital psychiatrist, but are known to regimental officers, combatant as well as medical.

(3) A study of various factors considered likely to affect the health of troops, and a comparison of different occasions when these factors were present or absent.

The details of the studies undertaken for this purpose were as follows :

(i) A general survey of the numerical incidence of psychiatric cases in British troops in South-East Asia and in Southern Army (India).

(ii) An individual survey of 700 British out-patients in a base area in India. These formed a consecutive series between September, 1943, and February, 1945 (except for the omission of a few whose case-notes were inadequate). Their symptoms and aetiology were studied in detail, and an analysis was made to discover any correlation existing between the types or symptoms, of individual and of stress.

(iii) An individual study of certain other groups of patients, who were apparently under the influence of special circumstances in South-East Asia.

(iv) A general study of the factors affecting the health and morale of troops on duty ; this was carried out by informal discussions with numerous officers and men in India and South-East Asia.

By the means of studying the health of large groups of men, and of discussing their problems with experienced officers, I hoped to be able to throw light on the extent to which broad influences (which are difficult to measure in any given case) affect the health of the army as a whole. Lest, however, this information should be thought too general in its nature, the detailed investigation of individual cases was also undertaken to provide confirmation.

For the sake of convenience, however, the findings of both investigations have been grouped together under certain heads. These are :

- A. The incidence.
- B. The symptomatology.
- C. The factors.

A. THE INCIDENCE : GENERAL SURVEY.

The incidence of psychiatric cases among British troops in the Far East may be conveniently surveyed under three heads. These are :

- (i) Incidence per strength.
- (ii) Ratio to all disabilities.
- (iii) Distribution of various syndromes.

(i) *Incidence per Strength.*

The ratio of psychiatric cases per 1,000 strength (i.e. healthy and sick troops) is not possible to give for Southern Army in India, since the average number of British troops in the area in each month is not available with enough accuracy.

The incidence in South-East Asia is obtainable for British troops, and the monthly rates are available for officers and other ranks, separately, showing the number of psychiatric admissions of each per 1,000 total strength, as follows :

TABLE I.—*Incidence of Psychiatric Admissions in South-East Asia.*

	Officer cases per 1,000 officers.	Other rank cases per 1,000 other ranks.
May, 1945 . . .	1.13	2.21
June . . .	1.15	2.30
July . . .	1.94	1.14
August . . .	0.94	1.13
September . . .	1.37	0.93
October . . .	0.45	0.57
November . . .	0.25	0.43
December . . .	1.08	0.79
January, 1946 . . .	1.19	1.0

I may call attention to several aspects of these figures :

- (i) Among officers there are steep rises in July and September, 1945.
- (ii) Among other ranks there is no comparable rise in these months, the peak having been reached in June.
- (iii) In October and November, 1945, figures for officers and other ranks fell below the average for the United Kingdom (quoted in para. 3 above). But apart from these two months, the average rate was far higher and exceeded even the rate of Middle East Force.

These figures do not make any distinction between front line and other troops, and it is very difficult to obtain any reliable evidence on these points.

The number of British troops in any psychiatrist's "territory" was by no means constant, so that it is difficult to obtain reliable figures in this way.

(ii) *Ratio to all Disabilities.*

The ratio of psychiatric cases to all cases is not available either for admissions to hospital or for out-patients in India.

It is, however, possible to give the ratio for cases evacuated from the Far East, for Southern Army in 1944 received all cases for evacuation to England from India and Burma, and the proportions obtained by myself from the Standing Medical Review Board were :

	All cases.	Psychiatric cases.	Percentage.
Officers . . .	1,259	286	22.7%
Other ranks . .	6,771	1,700	25.2%

It will be seen that although this figure is lower than the 40% reached (in the Western theatre) in 1914-18, it nevertheless exceeds the evacuation rate from Europe in 1939-45.

In South-East Asia monthly figures are available which show that the proportion of psychiatric admissions to all admissions ranges from 1.1 per cent. to 4.5 per cent.

(iii) *The Distribution of Various Syndromes.*

This has been studied in several large groups of patients (all British soldiers) :

(a) The 700 out-patients seen between September, 1943, and February, 1945, and selected for the detailed analysis later described. The proportions here were psychoneurotics and psychopaths, 78.0 per cent., defectives 14.0 per cent., psychotics 2.9 per cent., and others 5.1 per cent.

(b) The total out-patients seen in the whole of Southern Army (India) between 1 January, 1944, and 30 June, 1945. The proportions are psychoneurotics and psychopaths 80.5 per cent., defectives 6.0 per cent., psychotics 3.9 per cent., and others 9.6 per cent.

(c) The total in-patients seen in the same area as (b) and nearly the same period (1 July, 1944-30 June, 1945). Of these psychotics formed 14.9 per cent.

(d) The total out-patients in South-East Asia between April and June, 1946 (figures obtained from colleagues). Of these, psychotics formed 3.9 per cent.

(e) The total of in-patients for the same period and area as (d). Of these, psychotics formed 38.1 per cent.

(f) The total of in-patients for the same area but several months earlier (i.e. November, 1945, to February, 1946) of these psychotics formed 49.2 per cent.

It is unfortunate that the figures for the out-patients corresponding to (f) are only available for January and February.

(In groups (b)-(f) inclusive the figures are partly from my own cases, partly from those of colleagues, whose returns were submitted to me.)

It must be remembered that some psychotics will by-pass out-patient departments and reach hospital direct, so that out-patient figures will be rather too low. On the other hand, since practically all psychotics are admitted (but by no means all psychoneurotics), the hospital admission rate will be too high, and will in fact only show the ratio of psychoses to the total of *severe* psychiatric disorder. Similarly evacuation rates will show an even higher proportion of psychotics.

Information from this rather random harvest may be more easily gathered if the figures are stated in some order, shown as the proportion of psychosis to total psychiatric cases, and compared with those of para. 5 above. Table II summarizes this :

TABLE II.—*Ratio of Psychosis to Total Psychiatric Cases in Various Theatres (only British Troops).*

Theatre.	Date.	Percentage in out-patients.	Percentage in admissions.
U.K.	1943-'44 .	2.2-2.9 .	16.3-26.5
M.E.F.	Oct. '43- Mar. '45 .	4.9-7.4 .	19.0-31.3
Various corps and divs. in Burma	Oct. '43- Mar. '45	3.0-6.5 .	Unknown
Selected out-patients (India)	Oct. '43- Feb. '45	2.9 .	„
Southern Army (India)	Jan. '44- July '45	3.9 .	14.6-19.7
South-East Asia . . .	Nov. '45- Feb. '46 (Jan. and Feb. only)	7.25 .	49.2
„ „ . . .	Apr.-Jun. '46 .	3.9 .	38.1

From this it can be seen that (i) there is generally a higher rate of psychosis among out-patients of British troops in the East, (ii) that there was a rise among in-patients in the Middle East and, very markedly, in South-East Asia, but not in Southern Army. (It is possible that the last figure, which is lower in proportion than the out-patient figure, may be partly explicable on the grounds that there are more non-psychotics admitted to hospital, since alternative disposal (e.g. the Pioneer Corps) is precluded by the conditions of service).

B. THE SYMPTOMATOLOGY.

(a) *Psychoneuroses.*

This is better seen from a more detailed study of a smaller group, and to this end the group of 700 British out-patients (mentioned in paras. 21 and 23) has been analysed in detail (see Table III).

The classification of psychoneurosis used in Table III is not that laid down in the Army nomenclature and needs some explanation.

The four groups were separated on purely descriptive grounds, according to their superficial appearance.

TABLE III.—*Psychoneurotics in 700 Out-patients.*

	Officers.	Other ranks.	Total.	Percentage officers in total.
(a) Free anxiety	60	160	220	27·3%
(b) Psychosomatic syndromes	18	222	240	7·5%
(c) Depressive features	11	23	34	32·4%
Total psychoneurotic less obsessional	89	405	494	18·2%
(d) Obsessional states	5	9	14	35·6%
Total all cases	113	587	700	16·1%

Thus Group (a) covered those cases where anxiety occurred without complaint of physical disability.

Group (b), psychosomatic syndromes, contained cases whose presenting symptom was a physical complaint. This group was split up again on descriptive grounds into seven sub-groups, named after the site of their complaints, as follows :

(i) Head : Reserved for those in whom headache was the main complaint (except anxiety states as mentioned above). It was found that dizziness was often associated with headaches, and sometimes with complaints of eye-strain or photophobia.

(ii) Chest : Consisting of precordial pain and dyspnoea on exertion, palpitations and tachycardia.

(iii) Alimentary tract : Including epigastric pain, flatulence, diarrhoea, anorexia.

(iv) Back and neck : Complaints of fibrositis, lumbago, rheumatism (without adequate organic cause), and muscular stiffness or pain.

(v) Legs : Complaints of sensory or motor trouble, which interfered with locomotion.

(vi) Genito-urinary system : Including frequency, enuresis and pain.

(vii) The remainder were a heterogeneous collection, including deafness, blindness, stammer (of which incidentally there were only six cases), and fits.

It will be observed that no distinction here has been made between hysteria and visceral neurosis. This omission has been deliberate, since it is hoped first to present a clear picture of the presenting symptoms, and only later to discuss the underlying psychopathology, and consider which of these two terms was more appropriate for each particular case. It will be seen that groups (a) and (b) correspond practically to Ewalt's definition of simple anxiety (see below) and psychoneurosis respectively ; his third group contained cases with structural alteration. Now it is in fact difficult to decide whether or not any given case has a structural alteration, so that it is considered better, in a descriptive classification, not to separate such a group, but to include cases with possible structural change in Group (a) or (b) (whichever is appropriate to their presenting symptoms).

Group (c), psychoneuroses with depressive features, is again a descriptive label for those cases in whom the presenting symptom was depression rather than anxiety, and in whom there was no physical complaint.

Group (d), obsessional states, consisted mainly of long-standing cases whose precise aetiology was difficult to determine at an out-patient interview. For this reason, and because of their relatively small number, they have not been included in the analysis of factors which follows.

The psychoses have been described elsewhere (Tredgold, 1947).

C. ANALYSIS OF FACTORS.

The responsibility of the various factors is studied in several groups, the main one being the 700 out-patients mentioned. The 494 psychoneurotics in this group have been investigated in detail, and a summary of the findings is

shown in tabular form in an Appendix. For convenience, however, certain salient points have been withdrawn from this table, and are shown more simply in the main text. Material from other smaller groups has also been added where necessary to illustrate some particular point. Information obtained from my own observations in discussing these factors has been put in the shape of a commentary where it is relevant.

The various factors concerned were grouped in the literature under the heads of (i) Constitutional, and (ii) Environmental. This will also be followed here.

(i) *Constitutional Factors.*

These may be considered first in regard (a) to the psychoneuroses, later (b) to the psychoses, and (c) in general.

(a) *Psychoneuroses.*

An assessment has been made of each of the 494 cases, who have been shown as one of four types: (i) the dullards, men known to be in Selection Grade 5 (on the progressive matrices test); (ii) men with any psychosomatic trait, labelled here the "neurotic"; (iii) the normal; and (iv) the excellent, reported to have been outstandingly good at their work.

TABLE IV.—*The Relation of Previous Personality to Symptoms.*

Symptom.	Total cases.	Dull.	Previous neurotic.	Personality normal.	Excellent.
Psychosomatic :					
Head . . .	78	13	13	45	7
Chest . . .	35	5	9	18	3
Alimentary . . .	40	8	11	17	4
Back and neck . . .	24	1	4	17	2
Legs . . .	15	2	2	11	—
Genito-urinary . . .	17	5	6	5	1
Others . . .	31	6	9	12	4
Total psycho-somatic . . .	240	40	54	125	21
Free anxiety . . .	220	22	53	118	27
Depressive . . .	34	4	4	24	2
Total . . .	494	66	111	267	50
Percentages . . .	100	13·3	22·5	54·1	10·1

It will be seen that—

(i) Over 50 per cent. of each group, except genito-urinary, were without evidence of previous instability.

(ii) Dullards were commoner among the psychosomatic syndromes.

(b) *Psychoses.*

A survey has been made of constitutional factors in several groups of psychosis totalling in all 142 seen during this period.

(i) A group of 60 officers evacuated during 1944 from Burma and India. This forms part of a survey of 150 psychiatric officer casualties already referred to and published elsewhere (Tredgold, Heffernan, Kelly and Leigh, 1946).

(ii) A group of 59 cases evacuated from South-East Asia by hospital ship (H.M.H.S. "Atlantis") in March, 1946; they had become ill between August, 1945, and January, 1946.

(iii) A group of 23 manic states described elsewhere (Tredgold, 1947).

The presence of constitutional factors has been assessed as in Table IV above, that is as "dull," "neurotic" and "normal." There does not seem to be adequate evidence to grade any as excellent. The three groups are summarized in Table V, to show the high proportion of previously normal individuals.

TABLE V.—*Constitutional Factors in Psychotics.*

Group.	Total.	Dull.	"Neurotic."	Normal.
(i) Officers in India and Burma .	60	—	8	52
(ii) Hospital ship in S.E. Asia .	59	9	16	34
(iii) Manic states in S.E. Asia .	23	—	2	21·3
Total . .	142	9	26	107

(c) *General.*

The effect of previous personality on prognosis can be shown by an analysis of the rates of evacuation to England (i.e. as unfit) of the several types.

TABLE VI.—*The Influence of Previous Personality on Prognosis.*

	All cases.	Dullards.	Neurotic.	Normal.
Total cases . .	494	66	111	317
Cases evacuated .	185	39	26	120
Percentage evacuated	37·0	58·5	23·4	37·8

It is noteworthy that a greater proportion of normal than of neurotic had to be evacuated, but that dullards had a worse prognosis than either.

If both psychoneuroses and psychoses are considered together it may be seen that the evidence of previous instability is of very little significance. This is in line with writers quoted who refuse to place much reliance on "psycho-neurotic traits." The evidence here is that previously normal and even excellent soldiers provide the bulk of psychoneurotics and psychotics among British troops in the Far East.

Dullness, however, is of more importance, and it is justifiable to say that the dullard's chance of developing psychoneurosis is above normal. Whether a dullard is also prone to psychosis is hard to say, and the results here are inadequate to allow of an opinion; for the cases available to study, being largely officers, do not provide a fair sample in this connection.

(ii) *Environmental Factors.*

General.

These were grouped as enemy action, domestic affairs, physical health, employment, war aims and faith, and group relations. Of these six, the first four include adverse factors whose presence can be later detected with comparative ease; the last two produce an adverse effect by lack of positive qualities which are more difficult to estimate. It has, therefore, not been thought practicable to demonstrate them numerically, and attention has been concentrated instead on the first four. First, their presence in the group of 494 psychoneurotics is plotted in Table VII against the presenting symptoms.

TABLE VII.—*The Relation of Environmental Factors to Symptoms.*

Symptom.	Number of cases.	Factors.					
		Several together.	Enemy.	Domestic.	Physical.	Work.	Nil traced.
<i>Psychosomatics—</i>							
Head . . .	78	9	13	16	32	23	3
Chest . . .	35	6*	8	8	18	6	3
Alimentary . .	40	7	7	11	16	10	3
Back and neck	24	2	2	2	18	4	—
Legs . . .	15	2	1	2	11	3	—
Genito-urinary	17	4	3	3	7	4	4
Others . . .	31*	4*	3	7	15	8	4
Total							
psychosomatics	240	34*	37	49	117	58	17
Free anxiety .	220	41*	49	71	69	69	11
Depressions .	34	10*	6	23	7	9	—
	494	85*	92	143	193	136	28

* In several cases there were more than two factors operating, so a discrepancy in the totals will be evident.

The salient features are that—

(i) Physical factors were found in nearly 50 per cent. of all psychosomatic syndromes, and in 39 per cent. of the total. They were particularly high in back, neck and leg complaints.

(ii) Domestic stress and unsatisfactory work were next most important, the former especially so in the depressions.

It may also be of interest to investigate how these several factors were

distributed among officers and other ranks respectively. This has been worked out and is shown in Table VIII.

TABLE VIII.—*The Factors Operative among Officers and Other Ranks.*

Factor.	Officers.	Other ranks.	Percentage officers of total.
Enemy	6	86	9.8%
Domestic	17	126	11.9%
Physical	27	166	14.0%
Employment	39	97	28.7%
Total	89	405	18.0%

The normal ratio of officers to other ranks is approximately 1 : 20, so that the ratio here of roughly 1 : 4½ indicates a high officer casualty rate.

The higher proportion of officers affected by employment is clearly seen.

Next, the environmental factors may be considered *seriatim*.

(a) *Enemy Action.*

This is important as an aetiological factor in base areas in so far as it produces either a predisposition or a progressive condition, later to become fully fledged. Naturally there were many soldiers in any base area who had seen action elsewhere, and this number included men who had been through the campaigns in France (1940), Madagascar, N. Africa and Burma (1942-43).

It was therefore not surprising to find a number of patients in whom battle stress was of importance. The stresses concerned were various; but the majority consisted of some particular episode, such as being cut off on patrol, or seeing a friend blown to pieces at their side. None had been treated at the time. In many, repressed material was present and could be removed.

It would be interesting to estimate how many men had been through battle undamaged, only to be later overwhelmed by another form of stress. No reliable figures are available on this point, but it can be seen that only 92 of the 494 cases were regarded as having been affected adversely by battle (Table VII), which is probably less than the total exposed. If this is so, it is a tribute to the success of "battle inoculation" practised during training. It may, moreover, be noted here that enemy action was responsible relatively less often among officers (Table VIII), and that its effects responded more easily to treatment (below, Table XII) than did domestic and physical stress.

(b) *Domestic Affairs.*

In this survey domestic stresses have been divided into three groups :

(i) Proved infidelity of wife ; that is, definite cases, and not those which were merely suspect.

(ii) Separation : This group was restricted to cases whose complaint was simply that of persistent homesickness, without added domestic difficulty.

(iii) Other stress : The remainder included real or imagined illness of relatives, estrangement, financial or business troubles and bereavement.

The severity of these types of domestic stress can be seen from Table XIII. Their detailed effects need further study.

Naturally, some are inevitable, and none are directly under the control of the military authorities. But their effect on the soldier is by no means inevitable or unalterable; indeed in many cases their effect depends less on the nature of the original cause than on the attitude of the soldier's superiors and on the existing regulations. These are, therefore, important both in themselves, and in the impression they produce.

It was unfortunate that many soldiers had the impression that victims of domestic trouble would not receive much consideration. In the peacetime army the part played by the regular officer in looking after this side of his men's welfare was excellent; in war there are obvious difficulties (new officers, and a strain on administration), and there is more stress. But it was not the occasional errors which roused the soldier's resentment, but behaviour which implied a totally unsympathetic attitude.

(i) The subject of infidelity is a very clear example of the difficulties of both sides. It was common enough for most men to be acquainted with an example; there was a most fertile soil for rumour; the presence of foreign troops in England and the length of absence from home exaggerated the tension. Therefore there were many soldiers prepared to expect the worst (more than those who will now admit it), and many ready to believe it on the most inadequate grounds, such as delay in mail. Moreover, they were convinced that if the worst did occur, they would have little chance of a reconciliation by returning home. A victim's first impulse was to get home, but compassionate repatriation was not in his unit's power, but needed application to a tribunal. It was, moreover, subject to so many conditions and to such delay (at any rate till 1945) that it became an added irritation instead of a solace. As a result many developed severe psychiatric disorder, and had to be returned home on this account, but after the loss of much time, of much health and much of their comrades' confidence in the authorities.

On the other hand, the view was held that to introduce compassionate repatriation for infidelity would be to put a premium on immorality; the bad wife would get her husband home, the good would not. In fact, few soldiers (and perhaps fewer wives) had thought of the matter in this way at all; there would be pity, not envy, for a comrade going home to an unfaithful wife. It must also be recorded that it was by no means the irresponsible man whose wife betrayed him; good fighting troops, "the backbone of the nation," were equally affected (this was testified in a report by the C.O. and padres of a division quoted by Mathers (1944), who called attention to the alarming rise, mostly among men over 18 months' service overseas, which was then coupled with an expectation of two or three more years to come).

As to why this period of absence is important, there are obvious reasons: the soldier is bound to be losing touch with the interests of those at home; their worlds have spun apart; and only the best correspondents will have been able to portray their daily existence so vividly that it is still alive 6,000 miles away. This has happened most acutely between husband and wife, where other difficulties also may develop. The loneliness of either may lead them to

seek comradeship which culminates in genuine attachment or sexual promiscuity, with its guilt to follow. Stories current at home of the irresponsibility of their husbands overseas, and in the Army of the immorality of their wives at home, may be often an incentive or an excuse for yielding to any temptation offered—"what is sauce for the gander, is sauce for the goose."

Infidelity has been taken as an example because it presented a clear picture of the conflicting attitudes ; but other domestic stresses, such as bereavement, produced comparable results.

(ii) Homesickness or separation anxiety is a different problem, and in regard to this it is important to consider the emotions of the new arrival. It is singularly unfortunate that he is exposed at once to two further forms of stress. The first is the impression of not being wanted, produced by the interminable delay and boredom of transit camps, the casual remark, "But your trade isn't used here," and the general neglect. It is indeed the stone of neglect rather than the bread of affection given to a very hungry child. The combined effect of these factors is of the utmost importance. All ranks and all services have described it most bitterly, and perhaps the specialist branches most of all. The latter had been compensating for their homesickness by reassuring themselves that they were essential in their new work, and their disappointment was the greater. On a few occasions drafts have been welcomed at the port of arrival, and a full description of the conditions of life, the type of work, and the nature of the country has been given. The warm appreciation received has been witness to the need for increasing the scope of this welcome. The wastage which results from delays in posting and in travelling has only just been realized. Comments from embittered doctors have appeared in the medical journals, and now a report has been published by the Directorate of Research. But the assessment made is only one of hours or man-hours wasted ; it takes no account of the drop in efficiency of the men per hour, nor of subsequent damage to their will to serve.

The second stress which meets the new arrival is another kind of disappointment. He has consoled himself on his voyage out by the hope that there will at any rate be a letter waiting for him at his port of arrival—that is, there will be contact with home. Sometimes there is, but by no means always. No doubt there have been, and will be, very real difficulties of security and transport in the way ; but the price to pay for their existence is high. The soldier is in a most suggestible mood, and the colour of his feelings on landing may determine his whole attitude to the country for ever. This is, of course, even more necessary when the soldier arrives in a spirit of resentment from real or imagined injustice in drafting.

Length of Service.

The effect of length of service, both overseas and total, would be of interest. To obtain any figures of value, however, it would be necessary to know the overall distribution of the various service groups, month by month, throughout the army. This has not been available from any statistical source ; and I can do no more than call attention to a few points. It did not appear from a study of the figures that the *total* length of service had much effect on psychiatric breakdown, but some indication of the importance of overseas service can be given by the following consideration.

A study of 100 sufferers from venereal disease was made in the same area by several colleagues and myself. From this, it was evident that the average time for these men to contract this disease was 19 months after leaving home; that in the great majority the disease was obtained at their first intercourse in the east; and that many admitted they had sought the latter because they were suffering from homesickness or the news of some domestic calamity. The number of the "chronic promiscuous" was relatively small.

(c) *Physical Causes.*

The exact types of physical causes discovered in the 193 cases are shown in Table IX, being plotted against the presenting symptoms.

TABLE IX.—*The Relation of Types of Illness to Symptoms.*

Symptoms.	Total.	Malaria.	Amoebic dysentery.	Other alimentary.	Minor Ops.	Injury or disease of				
						Back and neck.	Legs.	Chest.	Head.	Other.
Head . . .	32	5	2	—	2	—	—	2	6	15
Chest . . .	18	4	3	—	1	—	1	7	—	2
Alimentary . . .	16	—	4	10	1	—	—	—	—	1
Back and neck . . .	18	2	—	—	1	14	—	—	—	1
Legs . . .	11	—	—	—	—	—	11	—	—	—
Genito-urinary . . .	7	3	—	—	2	—	—	—	—	2
Others . . .	15	2	—	—	3	—	—	—	—	10
Anxiety . . .	69	10	8	6	2	—	1	2	6	34
Depression . . .	7	2	2	—	1	—	—	—	—	2
Total . . .	193	28	19	16	13	14	13	11	12	67

There is here a clear relation between the type of physical factor and the psychosomatic symptoms produced. Thus of 16 with alimentary complaints, four had had amoebic dysentery and 10 some milder ailment. Of the 18 chest complaints, 7 had some organic chest lesion as a basis; while the physical factor in the back, neck and leg disabilities was even more marked.

There is still considerable disagreement about the relative importance of physical and psychological factors in many syndromes. It may, therefore, be of some value to study in more detail the ways in which the two were associated here. It was evident that this occurred on particular occasions:

- (i) Shortly after disembarkation.
- (ii) After evacuation from battle.
- (iii) On exaggeration of a minor ailment from fear.
- (iv) From resentment at unfairness.
- (v) After prolonged or repeated severe illness.
- (vi) After over-exertion.
- (vii) As an immediate escape from stress.
- (viii) On convalescence.

(i) *After disembarkation.*—Minor gastro-intestinal complaints are prevalent on arrival in the east, as are certain failures of physiological adaptation, such as lassitude or headache. It is not difficult to see how functional symptoms can be grafted on to either, for there is generally some degree of homesickness and frustration, and there is dislike or fear of the tropics and their indigenous fauna (reptilian, microbic or human). There are also preconceived ideas, whose inaccuracy is only equalled by their persistence, concerning the risks of cholera or of sunstroke. Thus the sufferer from diarrhoea or lassitude will

become convinced that he is unduly sensitive to the climate, and once his attention is focused on his symptoms they naturally persist. This reinforced his conviction, and his introspection, so that he is wellnigh incurable by either physician or psychiatrist—whose collaboration at an earlier stage might have been successful. Similarly headaches or early fatigue persist, though in a less dramatic way; attempts to evade the issue by allowing the patient to go to a hill station merely give him the chance of developing mountain sickness.

(ii) *After battle*.—There are several occasions when an individual's normal suggestibility is increased. One of these is after passing through severe emotional strain such as battle; a casualty, therefore, evacuated from the front line may be a candidate for a functional exaggeration; and the excellent system of speedy evacuation made this easy for many to develop; in fact, it caught in its net many already on the road to recovery. Unfortunately once they were posted in the evacuation pillar-box in Burma there was often no delivery till they reached a base hospital in India. Naturally doctors at staging posts on the way could not be expected to make a precise evaluation of the functional and organic components in each case, so that hysterical overlays were accepted (by doctor and patient) as organic. Once at the base, symptoms tended to remain as an obvious excuse for the soldier's presence there, and as a basis for a pension claim. Moreover, either wound or illness, but more especially the latter, might reactivate old fears of permanent damage to health.

(iii) *Exaggeration of a minor ailment*.—The individual's suggestibility again is heightened when he is in the presence of a doctor or nurse, whose lightest word is taken as gospel—a point too seldom realized by the modest doctor. "Careless talk" thus produces illness. No doubt patients who imagine some chance phrase to mean the worst are very ignorant, or very stupid; but the doctor is in a position to recognize either, and should behave accordingly.

(iv) *Resentment at unfairness*.—An entirely different type of mistake is made by the doctor who implies, and occasionally states, that the patient with a minor complaint is malingerer. Not unnaturally, the latter's symptoms increase; indeed, they could hardly do otherwise, for any improvement would be such a tacit admission of guilt as few would be strong enough to make. On the other hand, simple examination and reassurance could do much. It is the writer's opinion that while frank malingerer was very rare, the exaggeration of ailments in this way, part conscious and part unconscious, was always alarmingly large.

(v) *Over-exertion*.—Over-exertion was a common precipitating factor, often in the form of unaccustomed physical strain, in untrained individuals, or groups whose job was suddenly changed. Long hours servicing aircraft in the sun and glare no doubt accounted for the high incidence of headaches and dizziness in the R.A.F. (Table XI). Excessive salt loss in sweating certainly was responsible for much malaise, and some headaches. Increasing salt intake, if early, prevented this becoming established. Psychotic symptoms may also follow extreme physical and mental strain.

(vi) *Prolonged or repeated severe illness*.—Repeated attacks of malaria and dysentery often resulted in a general lowering of resistance, and so to ready breakdown under stress. It is significant that this commonly took the form

of anxiety or depressive states and that the prognosis was poor (Tables IX and XIII).

(vii) *An escape from stress.*—This is the classical hysterical mechanism, and certainly occurs to avoid battle, service overseas, work or responsibility. But it is suggested here that it is less frequent than is commonly supposed; and though gross hysterical reactions of this kind were seen often in Indian and African troops, they were comparatively rare among the British cases of this survey.

(viii) *On convalescence.*—Patients are often sent from medical or surgical wards, or from convalescent depots, with a complaint that previous symptoms have returned or sometimes with a typical anxiety state. These men respond to simple measures of reassurance, or to efforts directed at their morale; but without such simple measures may become intractable.

The explanation of this is probably that soldiers find it hard to resume their responsibilities; their physical powers recover faster than their mental. It was noteworthy that such men were most anxious to rejoin their unit—and it may well be that their most serious loss was that of their group morale.

Turning from the occasion to the type of patient, it may be seen that officers showed less effect from physical factors than other ranks (Table VIII), though there is no reason to suppose they were less exposed than the latter. It is perhaps reasonable to conclude that where there was greater understanding of the nature of the disease, there was less psychological exaggeration.

The importance of the attitude of doctor to patient has been stressed in this study. Taking case histories, I have been struck again and again by the emphasis the patient laid on this. It can be understood that many feel an urgent desire to get their resentment off their chests to some sympathetic listener, and then perhaps to make a fresh start. But instead of an opportunity for so doing, there is too often yet more repression, and impatience, and before long a chronic antagonism to all authority, and particularly to the army, is produced.

This is particularly true of psychotics. It is so consistent that one wonders how many would have been classed as psychotic if their feelings had been allowed free play in a long interview at once. Unfortunately, the people they meet first are generally concerned with bigger problems than the individual and have no inclination to cope with an admittedly difficult case. Impatience produces counter aggression from the patient, and this insubordination is suppressed, often by force. The aggression of hypomanics could mostly be traced to this source, though they were certainly over-active before; nearly all became co-operative and friendly in the face of sympathy. For the same reason, the use of civil mental hospitals, known to be such, is to be deprecated for service men overseas. The mental shock at being "taken for a lunatic" is a severe one, and may deal an incurable wound to the personality. Early kindness and listening will obviate much sedation and shock therapy later.

(d) *Employment.*

It will be recalled from Table VIII that employment was held responsible in a higher proportion of officers than of other ranks. This may be considered with the observation made from Table III that officers provided 27·3 per cent.

of the free anxiety states, 32·4 per cent. of the depressives, but only 7·5 per cent. of the psychosomatic. To throw more light on this, two further subdivisions of the officers have been made: Firstly, all have been grouped by their branches of the service; and secondly, those with bad employment have been divided into (a) frustration and (b) inadequacy, according as to which of these two sensations was produced. The results are shown in Table X.

TABLE X.—*Officer Casualties: Distribution of Various Factors among Branches of Service.*

Factor.	Infantry.	Artillery.	R.A.C.	R.A.M.C.	R.E.	Other branches.	R.A.F.	Total.
Enemy action . . .	3	—	—	—	1	2	—	6
Domestic stress . . .	1	2	1	2	2	2	7	17
Physical . . .	6	3	1	3	1	2	11	27
Frustration . . .	1	3	1	2	1	2	2	12
Inadequacy . . .	2	3	—	1	3	13	5	27
Total . . .	13	11	3	8	8	21	25	89

In parenthesis it may be observed that if the 18 officers with psychosomatic syndromes were subtracted from this Table they would not alter its overall appearance, for they were evenly distributed.

The greatest problem appears to be that of inadequacy, which was spread over the services rather than over the fighting units; it can also be seen that domestic and physical factors were more prevalent in the R.A.F. than elsewhere.

The losses due to inadequacy in officers were more disastrous than the losses of other ranks. The combatant arms were less affected than the services. One reason for this is no doubt that the choice of new officers is a wider one, and that they tend to attract a more stable individual. Also throw-outs from the arms may gravitate to the services. But these reasons do not by any means explain the whole position.

Examination of the cases concerned in the survey from India shows that there were some officers who could be regarded as constitutionally inadequate; it is safe to say that none of these would have passed one of the modern Selection Boards, but such cases were relatively few. The majority were officers who had been perfectly adequate in some capacity, but were simply not equal to their allotted works. The reasons for this were varied. Some were sent back too soon after illness and were physically not fit to take over their responsibilities. Others seemed to suffer more from a temperamental inability to deal with some particular aspect of their position. This is difficult to define, and may give rise to question; but records showed that they had in fact done reasonably well (sometimes excellently well) elsewhere, and that it was only when they met some especial obstruction that they gave in. The possession of aptitude for various occupations is now generally accepted, and it seems not unreasonable to postulate the existence of an opposite "pet aversion"—though it is realized that this term or this attitude often covers underlying complexes or even character defects to which attention has already been drawn.

Frustration was also marked in officers doing staff work. A separate study has been made of a group of 150 officers with severe psychiatric disorder (who

were in fact mostly members of this same series of out-patients) by three colleagues and myself (Tredgold, Kelly, Heffernan, and Leigh, 1946), and this has discussed the types of syndrome resulting. These were as those described in the literature, namely two main types. The first, the restless and over-anxious, and second the depressed. Of these the first was commoner. This type was also described in the account of manic states, with which there is some similarity.

Where these men could be given different employment they improved—the difficulty was to provide it. In India inter-unit transfers were difficult, so that frustration at the delay often supervened; and the prognosis was bad till local arrangements made with the military secretary's branch prevented evacuation.

The number of inadequate other ranks must seem at first sight a disturbing reflection on the efficiency of the much-heralded selection procedure of the Army. There are, however, some extenuating circumstances. In the first place, some of these men had been enlisted before there was any General Service Corps in Britain; many more had arrived in the East before this procedure was in full operation, and so had not been affected by it. Finally, even if selection can be arranged for overseas drafts, there are obvious difficulties, from the viewpoints both of morale and of administration, which interfere with its smoothness.

The Far East at this time, too, had by no means the highest priority, for material or for men, and there was an acute man-power shortage. All these points must be borne in mind by any critic. Nevertheless, there were in the East very few jobs which could be done by the man thrown out of a combatant unit, so that the disposal of misfits was an even more wasteful process than at home. The Pioneer Corps, as known in Britain, did not exist.

An investigation was also made of the type of work and branch of service of other ranks. These were plotted against the types of presenting symptom for the whole group of psychoneurotics; but no significant finding emerged from this, except that (i) the infantry predominated in other rank army casualties (47·7 per cent.), whereas, it will be remembered, only 20·3 per cent. of army officers came from the infantry, and (ii) the proportions of R.A.F. officers to Army officers was approximately 1 : 2½, but of R.A.F. other ranks to army other ranks was 1 : 10.

The Prognosis Associated with Environmental Factors.

It may also be valuable to look at these cases from another angle, which may contribute to the knowledge of the action and importance of environmental factors.

This is the study of the prognosis.

The various influences that may affect it are :

- (i) The environmental factors themselves.
- (ii) The symptoms.
- (iii) The branch of service and rank.
- (iv) The length of service.
- (v) Constitutional factors : these have already been discussed above.

(i) *The Several Environmental Factors.*

The effect of various factors can be seen from Table XI :

TABLE XI.—*Evacuation Rates from Various Factors.*

Factor.	Total cases.	Percentage evacuated.
Enemy action	92	34·8
Domestic stress :		
Infidelity	25	88·0
Separation	72	46·0
Others	46	50·0
Physical	193	36·7
Employment :		
Frustration	36	16·7
Inadequacy	100	33·0
No factor traced	38	42·9
Total	592	39·3
Several present	85	47·0

The total number of factors is, of course, greater than the 494 cases, for in 85 of the latter, two (or more than two) operated. In fact when this occurred the prognosis was worse. Secondly, of the individual factors, that with the worst prognosis was domestic stress ; in particular infidelity of wife was so severe that only three of the latter were not evacuated, and two of those had had an application for compassionate repatriation already under consideration when last seen.

(ii) *The Symptoms Themselves.*

These may be expected to exert some influence on the prognosis, inasmuch as circumstances may hinder the recovery of some more than of others. For instance, orthopaedic symptoms will be open to attack by orthopaedic measures, which are not incompatible with carrying on at duty, whereas gastric symptoms, if they are to be met by a diet, will entail hospitalization or at least light duty for some period, and will interfere so much with the soldier's efficiency that he comes to be regarded as an invalid by his friends, and so all the more by himself. Their effects are shown in Table XII.

There is little difference between psychosomatic syndromes and anxiety in prognostic value. Depression, on the other hand, is far graver. Of the psychosomatic symptoms the orthopaedic symptoms have the best prognosis, effort syndrome the worse, while gastric symptoms are midway.

(iii) *The Branch of the Service and Rank.*

The effects of these are shown in Table XIII.

TABLE XII.—*The Relation of the Presenting Symptoms to Prognosis.*

Symptom.	Total.	Percentage evacuated.
Head	78	33·3
Chest	35	48·5
Alimentary tract	40	32·5
Back and neck	24	16·7
Genito-urinary	17	41·2
Legs	15	26·6
Others	31	42·0
All psychosomatic	240	34·6
Anxiety	220	35·4
Depression	34	67·8
Total	494	35·2

TABLE XIII.—*Relation of Branch of Service to Prognosis.*

	Total.	Officers.						Total.
		Inf.	R.A.	R.A.C.	R.E.	Others.	R.A.F.	
Number	494	13	11	3	8	29	25	89
Percentage evacuated	35·2	39·2	27·2	33·3	12·5	51·6	52·0	42·7
		Other ranks.						Total.
		Inf.	R.A.	R.A.C.	R.E.	Others.	R.A.F.	
Number		174	78	31	—	82	40	405
Percentage evacuated		40·2	46·0	29·0	—	30·5	15·0	36·0

In the Infantry and Artillery the evacuation rate of officers and other ranks was very similar; but in other arms and services the proportion of officers was higher. The proportion of R.A.F. officers evacuated was nearly three times as great as that of airmen. As has been seen elsewhere (Table X), these R.A.F. officers were largely suffering from domestic and physical stress. The reason for a high rate of evacuation is partly the different policy adopted in this area by the R.A.F., namely that it was better to send a useful officer home to recover completely there than to employ him in India in part-time or unsatisfactory work. The follow-up of these cases is not available, but it is certainly a point of view which avoided deterioration overseas. There was no adverse effect on the morale of the remainder to be observed.

(iv) *The Length of Service.*

On compiling the Appendix, it did not seem as if the total length of service had any particular significance. That of overseas service, however, is of interest. The figures shown have been collected in Table XIV.

APPENDIX.—Analysis of

Symptoms.	Result.	Constitutional factors. Previous personality.				Environmental factors.						
						Domestic.				Physical.		
		Dull.	Neurotic.	Normal.	Excellent.	Enemy action.	Infidelity.	Separation.	Other.	Mal.	Amoeb. dys.	Others.
Headaches .	R.T.U.	4	10	33	5	12	—	7	1	1	1	—
	Evac.	9	3	12	2	1	3	3	2	4	1	—
Chest .	R.T.U.	1	5	12	—	4	—	3	—	1	—	—
	Evac.	4	4	6	3	4	1	2	—	3	—	—
Alimentary tract	R.T.U.	3	7	14	3	3	—	7	1	—	2	9
	Evac.	5	4	3	1	4	—	3	—	—	—	—
Back and neck.	R.T.U.	1	4	14	1	1	—	2	—	1	—	—
	Evac.	—	—	3	1	—	—	—	—	—	—	—
Legs .	R.T.U.	1	2	8	—	—	—	—	1	—	—	—
	Evac.	1	—	3	—	11	—	—	—	—	—	—
Genito-urinary	R.T.U.	1	5	3	1	2	—	2	—	1	—	—
	Evac.	4	1	2	—	1	—	1	—	—	—	—
Others .	R.T.U.	1	6	7	4	—	—	3	—	—	—	—
	Evac.	5	3	5	—	2	—	3	1	2	—	—
Anxiety .	R.T.U.	13	45	65	19	35	3	13	14	5	4	4
	Evac.	9	8	53	8	14	9	18	14	5	4	2
Depression	R.T.U.	2	1	6	—	2	—	2	5	1	1	—
	Evac.	2	3	16	2	4	8	3	5	—	—	—
Total .	R.T.U.	27	85	164	33	60	3	39	22	10	8	13
	Evac.	39	26	103	17	32	22	33	24	18	11	3
Grand total .		66	111	267	50	92	25	72	46	28	19	16

TABLE XIV.—Evacuation Rate Related to Length of Service Overseas.

	Half-years.			
	First.	Second.	Third.	Fourth.
All psychoneurotics .	57	70	65	62
Percentage evacuated.	26.3	37.0	36.8	42.6
All from domestic stress	15	18	10	17
Percentage evacuated.	40.0	38.7	50.0	58.7

The rise in the rate as service increases is clear.

(e) *War Aims and Faith.*

These factors were not easy to assess numerically, and their effect in any given case was hard to determine with precision. There can, however, be little doubt as to their importance, and this can best be described by outlining some circumstances.

(i) *Distance from the enemy.*—There is general agreement among officers that the further troops are away from the enemy the lower is their morale; although probably *apparent* distance is more important than *real*. The "stimulus of battle," in Mr. Churchill's phrase, is absent, and the demoralizing effect of feeling "out of the war" has been remarked. War aims are less easy to visualize. On the other hand, speeches and visits from war leaders, which stressed the value of every man everywhere, raised morale again.

(ii) *Loss of focus.*—Many soldiers' war aims needed a rather more concrete form than "patriotism" or "democracy," and no doubt a large number visualized themselves as fighting for their home, wife, family—generally

Factors and Symptoms.

Lays.	Environmental factors.										Branch of service and rank.									
	Physical.					Employment.					Other ranks.					Officers.				
	Back and neck.	Chest.	Head.	Others.		Frustration.	Inadequacy.	Nil.	Several.		Infantry.	Artillery.	R.A.C.	Others.	R.A.F.	Army.	R.A.F.	Total.		
1	1	1	5	11	.	6	9	2	5	.	18	8	4	11	9	1	2	52		
1	1	1	1	4	.	2	6	1	4	.	10	2	3	5	3	1	2	26		
1	1	4	1	1	.	1	1	3	2	.	7	5	4	4	2	1	1	18		
1	1	3	1	1	.	1	3	1	4	.	6	5	1	4	1	1	1	17		
1	1	1	1	1	.	1	5	1	4	.	12	5	3	5	1	2	1	27		
1	12	1	1	1	.	1	3	2	3	.	6	2	1	3	1	1	1	13		
1	2	1	1	1	.	1	3	1	2	.	7	3	1	2	4	3	1	20		
1	1	1	1	1	.	1	1	1	1	.	2	1	1	1	1	1	1	4		
9	1	1	1	1	.	1	1	1	1	.	6	2	1	1	1	1	1	11		
2	1	1	1	1	.	1	1	1	1	.	1	3	1	1	1	1	1	4		
1	1	1	1	1	.	1	1	3	1	.	4	1	1	1	2	2	1	10		
1	1	1	1	1	.	2	1	1	3	.	5	1	1	1	1	1	1	7		
1	1	1	1	1	.	8	1	1	2	.	9	1	1	4	1	2	1	18		
1	1	1	1	1	.	2	1	4	2	.	5	5	1	1	2	1	1	13		
1	1	1	1	1	.	18	39	7	24	.	44	15	14	27	8	25	9	142		
1	1	1	1	1	.	12	4	17	19	.	14	4	12	3	16	10	78			
1	1	1	1	1	.	1	2	4	4	.	3	3	1	1	1	4	1	11		
1	1	1	1	1	.	1	5	1	6	.	11	2	1	1	2	6	1	23		
1	12	6	19	44	.	30	67	16	45	.	110	43	22	57	26	39	12	309		
2	2	5	3	23	.	6	33	12	40	.	64	35	9	25	14	25	13	185		
13	14	11	12	67	.	36	100	28	85	.	174	78	31	82	40	54	25	494		

idealized—rather than for England. Consequently the news or even suspicion of damage to wife, or family, or a loss of their ideas left these soldiers with little to fight for. No doubt this was one reason why domestic stress was more common among other ranks relatively than officers, and why its effects were so serious, and again why prognosis in dullards was worse.

(iii) *The soldier's sense of his own value.*—Both these instances are examples of the effect of weakening the soldier's ultimate war aims. His morale may be attacked in another way by factors which lower his confidence in himself, or his sense of his own value. Frustration produced by unsatisfactory employment has been already discussed. Lack of information about his own role and how it fitted into the war effort was equally disastrous.

His sense of craftsmanship, too, was a faculty often neglected.

(f) *Group Relations.*

The soldier's sense of comradeship is too well known to need description, but is sometimes also too well known to consider. Many patients were seen in whom it was entirely absent. The old system of the county regiments grouped together men of similar nature and like interests. Unfortunately the system often broke down under the need for reinforcements, and it was difficult to ensure that convalescents always returned to their old units.

Confidence in leadership is naturally of the utmost importance. It is connected with the soldier's sense of security, and is, therefore, especially in demand when the latter is damaged by, for example, bad news from home. Certain soldiers' criticisms of leaders have been quoted in this text and case material, and it may be objected that these emotional attitudes are based on

false impressions ; that is, that the soldier has misunderstood the motives of his officers. This may well be so, but (at the risk of being obvious) it must be pointed out that what matters is not whether an impression is true or false, but whether it exists. On it depends the soldier's mental health.

It has also been objected that reactions such as have been described are uncommon, and only occur in already demoralized soldiers. To investigate this, an opinion survey of 895 soldiers in transit in Burma was taken by Browne, Coates and Wells (1946) at my direction. Their findings included the following :

" 1. The soldier feels a considerable amount of dissatisfaction with the amount of information he has been given on the conditions he will encounter when he comes abroad.

" 2. There is evidence of mental unrest concerning the possible ill-effects on health in years to come of service in this theatre.

" 3. There is evidently extreme discontent at what is felt to be excessive disparity in the privileges enjoyed by the higher ranks in contrast to those of the lower. To make matters worse, officers frequently make no effort to conceal the fact that they possess privileges . . . and indeed flaunt them in the other ranks' faces." (This it was emphasized was in a base area several months after the war, not in combat conditions.)

" 4. There is lack of sufficient explanation of the various aspects of military discipline and organization."

It will be seen how these various conditions, which affect the soldier's war aims and his relations with his group, illustrate the importance of the criteria laid down by McDougall and Freud as necessary for successful group behaviour.

Summary of Findings.

The salient findings may be summarized as follows :

A. Incidence.

(1) The incidence per 1,000 healthy troops in the Far East was rather greater than that in the west, and there were records of several sharp increases.

(2) The ratio of psychosis to all psychiatric casualties was higher in the east than in England. This increase was composed mainly of "schizophrenic" conditions, both in the Middle and Far East, but at the end of the Japanese war a series of manic states occurred and so produced a further rise locally. At this period the incidence of psychoneurosis was abnormally low.

B. Symptomatology.

(1) The symptomatology of psychoneuroses showed little variation from those in the west.

(2) The series of manic states just mentioned presented unusual features, and generally a good prognosis.

c. (i) Constitutional Factors.

(1) The findings of psychoneurotic traits gave little reliable prediction of breakdown ; but dullness increased the liability.

(2) Certain previously well-adapted men broke down under severe stress and some developed psychoses.

(3) Officers were relatively more prone to anxiety, depression and manic states than other ranks—particularly staff officers of an over-conscientious type.

c. (ii) *Environmental Factors.*

(1) Physical factors were more commonly present than others (and were found in 50 per cent. of psychosomatic states). Domestic stress and unsatisfactory employment were roughly equal in numerical importance.

(2) Domestic stress (especially infidelity) generally resulted in anxiety and depressive states. The severity of its results increased with length of service overseas.

(3) Frequently several factors were associated; in particular physical factors were often found to have produced psychological breakdown in soldiers who were also under emotional strain.

(4) These emotional strains were of various kinds :

(a) Anxiety from separation from home, or over home affairs.

(b) Fear of serious disability.

(c) Anxiety over inadequacy at work.

(d) Fear of danger.

(e) Resentment at unfair treatment.

(f) Frustration.

(5) A heightened suggestibility also occurred after emotional stress was over, or when a patient was in a doctor's presence. A general lowering of resistance often resulted from debilitating physical disease.

(6) The actual emotion experienced by any individual under stress depended not only on the type of stress, but on his personality structure, itself largely dependent on his past history. Thus certain men had a disproportionate response to certain stresses only. Others—less common—had a low resistance to all stress.

(7) The type of symptoms produced depended generally on the type of physical factor operating.

(8) Bad employment was more likely to affect officers than other ranks. The officers concerned were largely from the services—as opposed to the arms—or from staff appointments. Unsatisfactory employment was the commonest group of causes among officers.

(9) The syndromes these officers developed were of two main groups :

(a) Depression and apathy.

(b) Restlessness and tension, not clinically very remote from hypomanic excitement; borderline cases were recorded.

(10) Lack of war aims and of confidence in leaders contributed to psychological illness.

REVIEW OF LITERATURE.

A survey of the literature dealing with the mental health of soldiers in the Far East necessarily includes work done in other theatres, for the sake of comparison. It is best reviewed under several heads :

A. Surveys of the incidence of psychiatric cases.

B. Surveys of the symptomatology.

C. Surveys of the factors which affect mental health.

These have been grouped under the terms "environmental" and "constitutional."

A. Incidence of Psychiatric Cases.

There are three ways in which a numerical survey of psychiatric cases may be of interest. These are: (i) The incidence rate per cent. or per thousand of the total strength (i.e. of all troops, healthy and sick), (ii) the ratio of mental abnormalities to the total medical casualties, and (iii) the distribution of different syndromes within the total of mental abnormalities.

It is probable that these three figures will give more information if considered together rather than if separately.

(i) Incidence per Strength.

The incidence of psychiatric cases per strength (of 1,000 say) is not always easy to estimate, for the total number of troops in any area and any period is subject to much fluctuation as well as to stringent secrecy (at the time). Broad figures have, however, been published both for admissions to hospital and for out-patients.

Admissions to hospital.—In 1944 and 1945, in the United Kingdom, sample months showed a variation between 0.40 and 0.5 psychiatric admissions to hospital per 1,000 strength per month. In the Middle East over this period the admissions ranged from 0.8 to 0.9, i.e. practically double the rate in the United Kingdom (*Bulletin of Army Health*, 1945).

Out-patients.—Out-patient figures for the same period were naturally higher; in the United Kingdom they ranged from 1.3 to 2.2 per thousand per month, and in the Middle East Force from 1.3 to 2.0 (*Bulletin of Army Health*, 1945).

Civil life.—It is not irrelevant to compare these with rates in civil life. Blacker (1946), in a valuable survey, showed these were lower throughout the country than the service rates. He considered, however, that the rate of attendance increased where there was awareness among the population (that is, both patients and doctors) of a psychiatrist's presence and functions. While we may assume that this is in part the reason for the greater rate in the army, where awareness of the psychiatrist extends even further (beyond the patient and his doctor to his Commanding Officer), there can be no doubt that the chief cause of the increase is to the greater stress which is entailed in adaptation to military life.

It is less easy to see why the admission rate in the East should be greater than at home, whereas the out-patient rates in the two are practically the same. The significance of this is presumably that while psychiatric disease is not numerically greater in the East, it is more severe. A study of the distribution rates may show why this is so.

(ii) Ratio to all Disabilities.

In December, 1914, "nervous and mental shock" accounted for 7-10 per cent. of all officer casualties, and 3-4 per cent. of all other ranks, but for the whole war the rate was probably much higher, and it is known that at times 40 per cent. of cases evacuated were due to neurosis (*History of the Great War*, 1931).

In the 1939-45 war psychiatric disorders were responsible for 10 per cent. of all British troops evacuated from the European theatres.* They have also been responsible for between 34 and 40 per cent. of all discharges on medical grounds from the British Army—the six-monthly periods from 1 January, 1943 to 31 December, 1945, show 34.0, 35.7, 40.4, 40.5, 38.4 and 38.6 per cent. in chronological order (*Bulletin of Army Health*, 1946).

A further report of some significance is that of Squires (1933) that of 353 men invalided from the colonial service 45 per cent. were psychiatric cases (28 per cent. being psychoneurotics). Squires also pointed out that these cases were predominantly men in their first four years of service, whereas in England psychiatric disabilities had been spread evenly over 25 years' service.

In any consideration of these figures, however, it must be noted that the proportion of psychiatric cases to the total number of medical cases does not necessarily indicate the rise or fall of the former, since the latter is by no means constant, and may suddenly change on a large scale—e.g. from an increase of wounded after battle or a decrease of malaria from the introduction of mepacrine. It is, therefore,

* This figure is based only on a two months' sample for authority for total figures is not yet obtainable.

not possible to conclude more from these figures than that psychiatric disorder is an important cause of wastage of man-power in both wars. Its effects on the health of society in peace, and on the cost of pensions, seem likely to be equally serious.

(iii) *The Distribution of Various Types of Mental Abnormality.*

A study of historical accounts inevitably leads to the conclusion that the criteria for diagnosis have not been constant. The contradictory views of medical authorities were well shown by the *W.O. Enquiry on Shell Shock* (1922). While some contradictions still exist—particularly in regard to conditions with a physical component—nevertheless, on the whole, in World War II more definite standards of diagnosis were used for Imperial troops, and reports from different theatres may thus be compared. No doubt even here there will be inaccuracies, but since they will be roughly of the same order, the comparison may still be valid.

In considering reports of the distribution of the various types of condition, i.e. psychosis, psychoneurosis, and mental deficiency, it should be borne in mind that the last term is used in the army nomenclature in a broader sense than in civil life; in the army it includes dullards as well as defectives who are certifiable under the Mental Deficiency Acts of 1913 and 1927.

The relative proportions of various broad groups of disorder have been given by several authorities. James (1945) quotes the official statistics of the war, which show that the percentages among out-patient British troops in the Middle East Force were as follows:

	Psychoneurosis and psych. pers.	Mental deficiency.	Psychosis.	Others.	Total.
October–December, 1943	74.1	4.9	7.4	13.5	100
January–June, 1944	77.2	6.0	4.9	11.9	100
July–December, 1944	74.0	5.7	5.5	14.9	100
January–March, 1945	73.3	4.3	6.3	16.1	100

From official figures out-patients in the United Kingdom over nearly the same period were:

	Psychoneurosis and psych. pers.	Mental deficiency.	Psychosis.	Others.	Total.
January–June, 1943	57.0	29.0	2.9	11.1	100
July–December, 1943	60.4	25.6	2.6	11.4	100
January–June, 1944	70.9	16.7	2.4	10.0	100
July–December, 1944	78.5	10.9	2.2	8.4	100

(*Bulletin of Army Health*, 1945.)

Rather different proportions are given by Ballard and Miller (1944) in a study of 2,000 consecutive R.A.F. out-patients in England. Of these 1,366 were psychoneurotic, 62 mentally deficient, 45 psychotic, 2 malingers, 30 n.a.d., and 495 organic, medical and neurological cases. The total psychiatric cases would then be 1,473, and the percentages of this total would be psychoneurotic 92.7, mental defectives 4.2 and psychotics 3.1.

Psychotics do not always pass through out-patient departments, for they may be admitted direct to hospital. A study of their rate in hospital admissions will, therefore, provide evidence of the proportion of psychosis to the total *severe* psychiatric disorder; and so enable the importance of psychosis to be seen from another angle.

The figures for the percentage of psychosis to all psychiatric admissions (British troops only) are available from official sources (*Bulletin of Army Health*, 1945). In the Middle East they were as follows:

October–December, 1943	19.0%
January–June, 1944	31.3%
July–December, 1944	23.0%
January–March, 1945	28.1%

In the United Kingdom, figures are given for roughly the same periods. Besides giving the rate for all ranks they also give the rate for officers (that is, psychotic officers to total psychiatric officers) and other ranks (similarly).

These are as follows :

	All ranks.	Officers.	Other ranks.
April, 1942-March, 1943 . . .	25.3%	30.1%	25.0%
April, 1943-March, 1944 . . .	26.5%	45.8%	25.4%
April, 1944-December, 1944 . . .	16.3%	19.5%	16.2%
July and August, 1945 . . .	20.3%	21.0%	20.2%

In the Far East the problem is no new one ; as Miller, Wilson and Wittkower (1940) point out, the Duke of Wellington complained of the mental changes of his officers while serving in India. Nevertheless, no gross figures to compare with the above are available. There are, however, separate reports from corps or divisions in Burma by Miller (1945), Hurley (1945), Matas (1945) and Davis (1946). These are most easily expressed as the rate of psychosis in total psychiatric casualties, and have been summarized as a table for the sake of convenience.

Unit (and authority).	Date.	Total psychiatric casualties in British troops.	Percentage of these psychotic.
Miller (1945) . . .	1944-45, March-March	248	5.23
Davis (1946) . . .	1944-45, March-March.	?	3.0
Hurley (1945) . . .	October, 1943-July 1944	565	5.30
Matas (1945) . . .	September, 1943-February, 1944	354	6.5

If these figures are considered as a whole, it is reasonable to conclude that the admission rate (per total strength) is greater in the East, because there is a higher proportion of psychosis there. There is also a lower proportion of defect. It is possible that the decrease in defect may be regarded as a tribute to the process of selection of drafts awaiting service overseas. It is also possible that fewer men are classed as defectives because defectives developed psychosis or psychoneurosis, and so were classified under the latter and not under defect. However this may be, there seems an absolute increase in psychosis. No explanation is given for this by those who compiled these figures ; nor is there any explanation for the high proportion of officers among them.

B. *Surveys of Symptomatology.*

These are best described under—

(i) Psychoneuroses.

(ii) General.

Psychoses have been described fully elsewhere (Tredgold, 1947).

(i) *Psychoneuroses.*

Although it was at one time fashionable to speak of "war neurosis," it is now generally accepted that "there is nothing specific about the mental breakdowns that occur in war" (Curran and Guttman, 1945).

But the relative incidence of the various syndromes in war differs from that in peace, as was clear from the W.O. Enquiry (1922). Moreover, it was reported there by Head that the types varied with rank, for the vast majority of anxiety states were in officers, while conversion hysteria was practically confined to other ranks.

The proportion, moreover, of officers to other ranks among psychiatric cases was about 1 : 14, whereas the normal proportion in combatant units is about 1 : 30.

In this war the consensus of opinion has been that anxiety has become relatively much commoner among British troops, and hysteria correspondingly less so (Ballard and Miller (1944), Craigie (1944), Grinker and Spiegel (1944)). On the other hand, there has been an increase of psychosomatic symptoms noted by Dunn (1943), who makes the significant remark, "With the remarkable decline of the neurotic manifestations in the last war, i.e. anxiety states and conversion hysterias, the emotional tensions generated in this war are appearing as psychosomatic disorders."

Also Curran (1945) quotes a report from German sources that anxiety states were not common in the German Army ; even in the retreat from Russia (ideal in some ways in producing mental stress) little anxiety was seen, but inquiry elicited the prevalence of psychosomatic disorders which had apparently replaced it—possibly an example of how the type of symptom was determined by the doctors' expectation and attitude.

The classification and terminology of these various types of psychoneuroses has become a little confusing, and Ewalt (1944) attempted to clarify it. He described two groups of conditions which were both reactions to emotional and/or environmental stress, and which both showed physiological (but not structural) alterations. Unfortunately he termed these two groups (a) simple anxiety and (b) psychoneurosis, according as to whether somatic symptoms were absent or present. Finally he placed in a separate group (c) cases which showed alterations of structure as well as of function, and due also to an emotional reaction.

Ewalt's choice of the term psychoneurosis is not very helpful ; for this term is generally used for a larger group than the one he so designates ; but (apart from this) his concept of a separate group of this kind does help to clarify the position.

c. *Survey of Factors.*

This may be subdivided into two groups :

- (i) Constitutional.
- (ii) Environmental.

(i) *Constitutional Factors.*

These are best regarded from the points of view of (A) the psychoneuroses and (B) the psychoses. Separately, under another paragraph (c), is a short discussion of the positive aspects of the personality.

(A) *Psychoneuroses*.—A discussion of the constitutional factors involved at once raises an ancient controversy. As Dunn (1941) pointed out after reviewing the literature, there are two major schools of thought ; one is a tendency to consider all neurotic reactions as predominantly constitutionally determined, with an inherent predisposition ; the other accepts the importance of inherited predisposition in some cases, but would stress that soldiers of previously sound personality may break if the strain is severe enough or too prolonged. The strain may be mental or physical, or both. Personality is, in the phrase of Menninger (1937) " the individual as a whole . . . all that anyone is, and all that he is trying to become."

The difference of thought is not merely in the ranks of the medical profession. It exists equally sharply in the Army. The first opinion was accepted at the beginning of the war by a number of senior officers, who were convinced that if a man broke down this proved that he had in fact " always been yellow," however good his previous record had been. This argument rendered terminology meaningless ; the best military test of the soldier's personality before was surely how he had in fact reacted ; and if he had done so satisfactorily, later efforts to regard him as " always unstable " are beside the point.

The second school's opinion is that some (not all) cases of psychoneurosis occur without inherent predisposition. This school has received increasing support from the studies of battle casualties made at the time of Dunkirk (Sargant and Slater, 1940) till reviews of several years of war now available (e.g. Strecker and Appel, 1945).

Since both schools agree that there are predisposed individuals, there has naturally been much consideration as to how these can be detected. It has mostly been along three lines of study : those of (i) psychoneurotic traits, (ii) heredity, and (iii) personality types.

(i) *Psychoneurotic traits*.—There has been much argument on the importance of so-called psychoneurotic traits. Among the latter are classed enuresis, nail-biting and stammering—to mention a few.

Some of them are no doubt often associated with unstable individuals ; but they are also known to occur in the healthy and in the brilliant. To meet this difficulty, Porter (1943) suggested that they might have a cumulative importance ; he thought that the possessor of six of the above traits was a candidate for breakdown, while the presence of four only might be disregarded. But he described a

control group of apparently normal men, who showed nearly as many pathognomonic signs as an equal number of breakdowns, which scarcely supports his theory. Similarly Sheps (1941) described a series of "successful soldiers"; 58 of these had been stable in battle, but 34 of the 58 showed some abnormal traits.

Hastings, Wright and Glueck (1944) have demonstrated in their review of the Eighth U.S. Air Force (first year) that 50 per cent. of 150 men who successfully completed tours of combat had a previous record of emotionally unstable behaviour, and often some family instability. But Anderson (1946) shrewdly comments that this only shows (a) that combat is not all-important, and (b) that their service did not expose them to specific situations to which they had been previously sensitized. Anderson's view is that patients respond in the light of past experiences and psychological wounds remaining in their personality structure.

(ii) *The influence of heredity*.—This was investigated by the Medical Department of the U.S. Army (1929), but there was scarcely any significant difference between psychiatric cases and normal soldiers.

(iii) *The question of personality types*.—This was discussed by many witnesses, medical and combatant, before the War Office Enquiry into Shellshock (1922), and although there was a general opinion that the majority of cases (though never all) could be predicted, there was little agreement on the type of personality most likely to suffer. (On the other hand, the value of "man-management" in preventing "shell shock" was accepted by all.)

Various authors have delineated certain types of personality which they consider particularly likely to develop psychoneurosis.

It is obviously difficult to fit all cases into any scheme of classification, but attempts have been made by several writers. Stungo (1946) described four groups: (i) steady, sober and rigid; (ii) responsible, over-conscientious; (iii) dependent and immature; and (iv) constitutionally inferior. Halliday (1943) made also four groups and specified their probable symptoms under stress: (i) histrionic—autonomic; (ii) hypersensitive—asthenic; (iii) self-assertive—ulcer; and (iv) self-instructing—rheumatic. But he points out that the assessment of types is still very inadequate. In fact, it seems doubtful if a useful purpose can be served by attempts to force all cases into one or other group; the latter of necessity become so broad as to be of little value.

Nevertheless there are certain types which are recognized by many writers to be of particular significance: (a) The over-conscientious obsessional active type was found by Wishart (1937) to be the commonest in effort syndrome. Wittkower, Rodger and Wilson (1941) agreed that it accounted for 40 per cent. of cases they saw, and considered overwork or fear (generally a fear of being afraid in battle) the usual precipitating factors. Crile (1940) said that the majority of patients with effort syndrome (as well as peptic ulcer, and hyperthyroidism) were of the active and energetic type called "energetic, obsessional, irritable," found by Gainsborough and Slater (1946) in a disproportionate number of proved cases of peptic ulcers; these authors concluded there was an over-activity of the vegetative nervous system.

The over-conscientious obsessionals have been found by Culpin (1931) to develop frustration unduly easily. A sense of urgency produces overwork and no rest is allowed. This may result in depressive features (Gillespie, 1942). Culpin quotes an obsessional who developed typical manic-depressive cycles.

Explanations of this have been given in psychopathological terms. Wittkower and Spillane (1940) suggest the basic personality structure may be weak because it is characterized by self-centredness, lack of sociability and lack of affection; the danger of death is to the patient a threat to his self-love, and his response is to regress to a narcissistic level; his ego-libido becomes inflated, and the abnormal sensations resulting produce hypochondriasis. In the view of Freud (later quoted in detail) individuals exposed to frustration are likely to break down if they are of certain types; of which the rigid individuals, and those whose libido never frees itself from infantile fixation, perhaps may be taken to correspond respectively to this over-conscientious type and to the dependent type now to be described.

(b) The dependent type is considered by Fairbairn (1943) to be the most important. He states that it formed the bulk of cases in an E.M.S. hospital, and suggests the whole problem of a predisposed personality is merely one of emotional dependency. It is probable that this view, based on the more chronic cases, is too sweeping.

Alexander (1934) considers that dependence is always to be found in gastric neuroses; but admits that in some it takes the form of an over-compensation, which presents the picture of ambitious efficiency. Dunn (1942*b*) has observed the dependent and the responsible types associated with gastric symptoms.

(c) The histrionic type—one of Halliday's groups—is considered by Ellman, Savage, Wittkower and Rodger (1942) to develop rheumatic pains.

Mention must also be made of the dullard. The liability to psychoneurosis has been widely recognized in the Army, e.g. Hargreaves (1940). Brooks (1929) commented on the number of ineffectual manual labourers among his cases of effort syndrome.

(B) *Psychoses*.—This has been discussed elsewhere (Tredgold, 1947).

(c) *Positive Aspects*.

In all these writings surprisingly little attention has been paid to the more positive facts of character. Nevertheless, it is apparent that the prediction of psychological breakdown can be regarded as analogous to that of cardiac breakdown, and can be made in the same way, by assessing the functional capacity and comparing it to the coming stress. The capacity can be gauged from symptoms and signs, in psychic or cardiac trouble alike. In fact, many military psychiatrists have admitted that their assessment is much helped by the reports obtained from the unit officers about the patient's behaviour and efficiency. These officers were excellent diagnosticians, or rather prognosticians, and sometimes took great care to keep a particular soldier out of battle because he was "obviously no good," not because of specific traits—they had in fact little idea whether he bit his nails or not.

Thus in practice a more positive approach is being made. But more definition is still needed, and more information about the assets of a man's character and their significance. In this respect the records of officer selection boards may later provide valuable material. An assessment of "officer quality" is not made solely from the angle of defects, or there would be grave errors and probably the loss of brilliant men. The candidate is, instead, regarded from the aspect of the balance between his good and bad qualities—which is a point forgotten by some who ask (in all innocence?) whether Nelson or Napoleon would have passed a modern selection board.

As described above, more emphasis is now being put on personality types than on psychoneurotic traits. Moreover, the former concept indicates certain possible lines for preventive psychiatry. Consideration of this will include the positive factors as well as the weaknesses. Thus the over-conscientious type is obviously not one to be exposed to situations where frustration is likely; he must, moreover, be helped to find a substitute goal, and particularly must he avoid the ways of regression to infancy and of fantasy. That is, he must have as much interest as possible, and he must not be kept idle in a hospital where the restrictions remind him of his childhood. The positive aspects of his personality must be encouraged.

(ii) *The Environmental Factors*.

These are best discussed under various headings as follows:

1. Enemy action.
2. Domestic affairs.
3. Physical health.
4. Employment.
5. War aims and faith.
6. Group relations.

It is clear from the literature that it is often difficult to decide what particular factor is responsible for mental ill-health; or if several factors are evident, to decide on the most important. Some writers group them by their time of action as predisposing and precipitating; but naturally any factor may predispose in one case and precipitate in another, without changing its nature. It seems best, therefore, to consider the nature of the various factors under the six groups given above; bearing in mind that in each type there will be favourable as well as unfavourable circumstances.

1. *Enemy Action.*

The immediate effects of enemy action on the mind of the soldier have been described and analysed by many writers, in the war of 1914-18 (of which the *War Office Enquiry into Shellshock* (1922) gives a summary), and in that of 1939-45. The twin pictures of anxiety and hysteria in the front line have been drawn and redrawn again and again. The precise importance of battle stress is not always easy to measure, and there is some divergence of views on the subject. James (1945) estimated that only 35 per cent. of the 4,000 cases he investigated from the Middle East were due to battle. Ballard and Miller (1944) said that only 15 per cent. of the 2,000 R.A.F. cases they saw were even from operational stations. Mullinder (1945) thought that out of 138 psychotics from Normandy, 127 were due to battle. Tooth (1944), writing of sailors, attributed 193 of 398 cases to enemy action. The position naturally varies with many circumstances.

Besides the *immediate* effects of battle, these authors have also described the *remote* effects. The latter have undoubtedly contributed to many breakdowns in base areas; for patients who have been through various campaigns without symptoms or without treatment, and who have later broken under a different type of stress, show a clinical picture obviously derived from the original battle stress.

2. *Domestic Affairs.*

In 1914-18 domestic stress was given far less attention by most British observers than the stress of battle. In 1939-45, however, it came into greater prominence, especially in regard to troops in the east. There were, of course, more soldiers serving in the East than in World War I, and many had over four years' absence from home; even more had for a time the expectation of such absence.

There are two types of stress which may be described, (a) homesickness—also known as separation anxiety or nostalgia—and (b) domestic calamity. The former is presumably present in some degree in nearly all men parted from home. The latter is actually only experienced by a few unfortunate individuals; but the fear or threat of it may be operative in a much larger number; it may be in the shape of bereavement, illness, financial loss, or estrangement from wife or family.

(a) *Homesickness.*—The state of mind of the homesick soldier in the Middle East is very clearly described by Main (1943). Comparable pictures are drawn by Greiber (1945) for American troops, and by Burdon (1944) for British sailors.

The effect of homesickness may be expected to vary at different periods of separation. Main's view was that it began after six months, and steadily increased thereafter; Burdon went so far as to say that two years' service away from home was likely to produce a marked effect in most normal people. Greiber differentiated two periods of maximum effect in American troops, the first between two and four months overseas—which affected the more dependent individuals—and the second between 14 and 24 months. Homesickness may be increased if there is any failure of war aims (Greiber, 1945), or in enforced idleness. The association of homesickness with gastric symptoms was noted by Mitchell and Mullin (1944), who estimated an unusual degree of homesickness in 45 of 50 cases of gastric neuroses. This was not so in 50 control cases of other psychoneuroses.

(b) *Domestic calamity.*—The effects of this were also described by the same authors, who regarded it as an important problem. On the other hand, Stephenson (1944) considered that the domestic problems of the sailor in the Far East were less than those of the soldier, and attributed this to his shorter expectation of service away from home (seldom over 27 months). But Tooth (1944) examined 398 cases of psychiatric disorder in two naval hospitals, and found domestic stress present in 90. He considered real or suspected infidelity as the commonest single cause. The invaliding rate of such cases is given by Tooth as 35.6 per cent. (to be compared with 29.0 per cent. from battle stress and 22.6 per cent. from "service conditions").

These writings show clearly that the problems of simple homesickness and of domestic calamity in the East both deserve considerable study.

3. *Physical Health.*

The influence of health of the body on that of the mind is a vexed question, and one moreover on which the consensus of opinion has recently changed and is

perhaps changing still. It is easier to discuss the psychoneuroses and psychoses separately.

(a) *The Relation to Psychoneuroses.*

It is not long since many syndromes now considered psychosomatic were regarded as organic; of these the most instructive is the first:

(i) *Effort syndrome*.—Although this was described by Da Costa in 1871, it was still widely thought of as due to a cardiac lesion until Sir T. Lewis (1918) pointed out that the majority of cases (83.2 per cent.) had no organic lesion, in spite of the fact that 23 per cent. of cases had a past history of rheumatic fever or chorea. He also remarked that heart cases were at that time the second most numerous medical disability.

Since then discussion has largely centred on the question of how much importance is to be given to physical factors and how much to psychological. Most physicians agree that in some cases the first is the cause, in others the second. Thus Hurst (1944) described physical causes, but reminds us that "soldier's heart is often nothing more than a manifestation of an anxiety neurosis." Frazer (1940) advised collaboration between cardiologist and psychiatrist; Grant (1940) listed as his causes constitutional weakness, exhaustion, delayed convalescence and external infection; while Parkinson (1941) divided his causes into constitutional, psychoneurotic, infective and myocardial degeneration.

Psychiatrists naturally tend to stress the psychological factor (e.g. Ross, 1940, and Wittkower, Rodger and Wilson, 1941). Moreover, Maxwell Jones and A. Lewis (1941) analysed 100 cases, and while they considered 11 per cent to be partly infective and 11 per cent. due to organic heart disease, they drew attention to the subjective phenomena, and noted that fear was frequently the emotion concerned.

(ii) *The gastro-intestinal symptom-complex has usurped pride of place* in the 1939-45 war, and has been considered to be the most prevalent single type of disease among British soldiers. The increase was thought by Tidy (1941) to have occurred in civil life before the war; and its appearances later would then be due to the fact that many cases latent in civil life were revealed on enlistment or precipitated by army diet.

Here, again, there is much disagreement as to how often an organic basis is found, and figures range from 89 per cent. (Payne and Newman, 1940) to 32 per cent. (Spillane, 1941). Tidy's view (1941) was midway between the two—65 per cent.—and is based on 2,500 admissions to hospitals, but Tidy pointed out that in out-patients transient dyspepsia, without organic cause, was relatively commoner. This was in fact often to be regarded as a transient failure to adapt, and should respond to reassurance and sedation as an out-patient. Hurst (1941) also stressed the danger that either lack of such treatment, or over-hospitalization, might allow symptoms to be exaggerated or even become incurable. The syndrome may well be called effort dyspepsia (Hill, 1943).

American writers have tended to stress the psychological factors, and this view is supported by the work of Wolf and Wolff (1942). They were able to inspect the living gastric mucosa, and reported that changes in its surface accompanied certain emotions—pallor from fear or sadness, hyperaemia and hypermotility from anxiety or resentment. The latter were also accompanied by heartburn, and in intense emotion to congestion and haemorrhage.

The question was also studied from the psychoanalytic angle by Alexander (1934). He regarded such organic changes as the end-result of a chain of processes, of which only the first was psychologically determined. (The symptoms were thus contrasted with those of conversion hysteria, which were a direct expression of an unconscious tendency.)

Alexander considered that there were three types of gastro-intestinal disorder which might result from psychological causes; these he called gastric, colitic and constipation syndromes. The gastric, he thought, was due to a depression of oral-aggressive tendencies and the increase of receptive tendencies, with a chronic over-activity of the stomach (a chronic wish to be fed or chronic dependence). Over-compensation of this might lead to a conscious attitude of exaggerated independence, which he reported in certain cases.

His explanation of the psychological basis of colitis and constipation was, as he admitted, somewhat less convincing; but he described colitis as a substitute for

the giving of real values and constipation as a reaction against the obligation to do so; and associated these syndromes with these attitudes in their possessors. Further, Alexander and Menninger (1936) described how the constipation syndrome might result in pessimism, melancholia or paranoid trends.

After reviewing much work, Dunn (1942*a*) makes the significant comment, "The British attitude to the importance of emotional factors is rather similar to that which was present regarding such factors in regard to neurocirculatory asthenia" (i.e. effort syndrome) "prior to 1917."

On the whole, then, the rise in gastro-intestinal syndromes certainly seems as likely to be explained in terms of increased psychological stress as by physical reasons.

(iii) *Rheumatic complaints*.—These have been discussed by Ellman, Savage, Wittkoff and Rodger (1942), and exhaustively by Halliday (1937*a* and *b*, 1942, and 1943). The latter's view is that at least 40 per cent. of non-arthritic rheumatism is in fact psychoneurotic. As he puts it, "persons who suffer from psychoneurotic illness not infrequently develop a symptom complex, which includes pains or aches and stiffness or limitation of movement with or without loss of power." These symptoms are regarded by many as due to organic disease, and labelled muscular rheumatism, myositis, fibrositis, lumbago, etc. The time and manner of onset may be determined by a combination of physical causes and psychological stress.

The latter may occur in several ways in Halliday's view. A transient emotion (e.g. anxiety or resentment) may become attached either to the site of an old injury or disease, or to the site where disease is feared (thus pleurodynia occurs in fear of tuberculosis). A third determining factor is symbolism; thus resentment or obstinacy may be expressed as stiffness, while aggression may be represented by brachial neuritis or sciatica (a repression of the desire to hit out or kick out).

The importance given to resentment in these views is to be noted.

(iv) *Headaches and dizziness*.—This syndrome is familiar enough to R.A.M.C. officers in the East; it has attracted less attention in print than might be expected. It has, however, been described by Palmer (1945), and from this it seems equally well known in the Middle East (as "Middle East headache"). It should not be regarded as a part of effort syndrome for several reasons: it is not accompanied by features which draw the patient's attention to his heart; the symptoms occur without exertion and are not always increased by it; they are sometimes the same in the hot weather in England, and they begin soon after arrival in the East, or after working in great heat and light as, for instance, servicing aircraft.

These cases are not sequels to heat stroke; indeed, in this connection it may be noted that heat stroke is less common than popularly feared. Thus Leishman and Kelsall (1944) surveyed 11,645 medical cases in a hospital in Western India and recorded only 49 cases due to heat. It is true, however, that any cases of true heat stroke who showed neurological symptoms would have been missed by this survey, and as these do appear in relatively higher proportions in neurological surveys (e.g. MacAlpine, 1946) the total figure will not be quite so low.

(v) *Psychosomatic symptoms in general*.—If these may be considered for a moment as a group, several points may be made:

(a) In many writings we see how important is the whole attitude of the doctor. This has been stressed by many psychiatrists—Ross, for instance (1944), and in the U.S. Army it drew a special directive from Menninger (1943). It is also supported by many eminent physicians—Ryle (1939), Tidy (1941), Parkinson (1941) and Conybeare (1945). Ryle puts it: "It is not rare for a patient to present himself in a state of anxiety because a suspicion of disease has been created by an unwise medical opinion." Hurst (1944) reminds the medical officer that he must accept the responsibility of treating his own cases without constant reference to specialists. The dangers of hospitalization were well summarized by the Medical Department of the U.S. Army report (1929): "The general hospital is the culture medium of the effort syndrome."

The importance of the doctor's behaviour must lie in the emotion it engenders in the mind of the patient.

(b) This leads to the whole question of the emotion which occurs (from any cause) simultaneously with a physical disability. It will be remembered that several authors discussed this, and described how in effort syndrome fear was common; in the gastric cases, a craving for appreciation; in the rheumatic, resentment. This was not, of course, constant in all cases of these types. A

shrewd prediction was made by Gordon (1940): "We may have to lay more stress on the significance of the situation present when the breakdown occurred, rather than on the history of the past."

(c) In each syndrome controversy has occurred on the relative importance of physical and psychological factors. In the longest discussed—effort syndrome—a middle view is coming to be accepted: that both are important, sometimes one more so, sometimes the other. It is not too much to suggest that a similar answer may be given to all psychosomatic syndromes.

It is also possible that even when one predominates, it is the combination of the two that is essential. Ryle (1936), for instance, has described how the origins of visceral neurosis may be found in previous inflammation, or in a specific sensitization; they may also be precipitated by external factors, such as cold, by fatigue, or emotion, and are predisposed to by the tension of anxiety. Moreover, several of these factors may be combined.

4. *Employment.*

Work may be unsatisfactory because it is too difficult, too easy, or of the wrong kind. The first will generally produce a sense of inadequacy in the individual, the latter two a sense of frustration. In this war the wastage due to unsatisfactory employment has been recognized, and the maximum attention has been given to matching the individual's intelligence and aptitudes with those required for specific jobs. Selection as a regular army procedure is now presumably permanent. Dunn (1941) has surveyed 130 articles (mostly English and American), and concludes: "The best means of prophylaxis is through proper selection of recruits. This is a conclusion now widely accepted. One finds emphasis on this point in nearly all the references." But circumstances may enforce idleness or work realized to be unsatisfactory. It is therefore necessary to consider the results on the individual.

(a) *Frustration*.—This term is commonly used to describe a feeling of wasted ability and consequent tension. It generally takes one of two rather different forms; either, first, a state of anxiety, irritability, restlessness, insomnia and some over-activity, with a feeling of underlying unrest, but a capacity of doing considerable work—at a cost to subordinates as well as to the sufferer; or second, an anxiety state with depressive features, which at times changes to apathy—a syndrome which, as Gillespie (1942) points out, is not unlike the medieval term "*accidie*," used (significantly) of monks who had mistaken their vocation.

Although the origin of frustration is in unsuitable work, its effects on the individual may be enhanced by certain conditions. Examples of these are:

(i) Idleness combined with *homesickness* has already been mentioned under the latter head.

(ii) Work in *base areas* has been the subject of a special study of officer patients (Tredgold, Heffernan, Kelly and Leigh, 1946). Here it was shown that out of 150 officers evacuated for psychiatric reasons from the Far East, 120 came from base areas. The lack of outlet for aggression and the sense of being out of the war were both considered severe stresses. As Mr. Churchill said, these officers lacked the stimulus of battle; it may be recalled that in *The Aftermath* (1929) he described the difference between the morale of base troops and fighting units.

(iii) *Staff work* increased frustration, and its causes have been described by MacCurdy (1943) in an illuminating account of the effects of departmentalism. Here the lack of outlet for aggression is even more important, for irritation and tension are vented on subordinates, so that a vicious spiral develops. The desire for scapegoats is significant; the next higher formation "they" are always blamed, so that G.H.Q., the apex, inevitably becomes a byword.

Explanations of these phenomena have been given on psychoanalytic lines.

Frustration was discussed very fully by Freud (1912). He applied it first to the removal of an actual object which satisfied an individual's erotic need. Frustration thus dammed up the libido and, therefore, tested both the individual's tolerance of tension and his manner of relief. He could transpose the tension into energy directed towards the outside world, and finally wrest from that world an actual satisfaction for the libido; or he could sublimate it to ends which were no longer erotic, and thus eluded the frustration. There is the danger of the libido becoming introverted, turning away from reality to take refuge in fantasies, generally reanimating earlier ones. Alternatively illness could occur from an internal

inability to seize a specific gratification offered. From this failure libido again may be dammed up, with similar results. Thus breakdown may occur either because the individual cannot renounce a gratification, or because he is too rigid to accept one.

Freud concludes with the warning that the antithesis of external and internal factors is likely to be unfruitful, and looks for the cause of neurosis in a definite mental situation, which can be brought about in different ways.

Although Freud's original views concerned an erotic need, it would seem from the above and later work (1933) that he included also substitutes. Thus: "The personality is healthy as long as his erotic need is satisfied by an actual object . . . he becomes neurotic as soon as he is deprived of this, and if no substitute is forthcoming." Rosenzweig (1938) discusses the question of frustration tolerance, and compares it with immunization; the normal individual, he considers, has a general high level of frustration tolerance (built up by normal education); the neurotic has a specific area of low tolerance, and the psychotic has many such areas, or a generalized low tolerance. Psychoanalytic treatment can thus be compared with desensitization, and the production of insight as closely allied to the formation of tolerance.

The specific symptom of depression is explained by MacCurdy (1925) as due to egotism outdistancing the supply of energy, and the intellectual endowment. Anxious thoughts and attitudes (significant alike of repression and of a sense of inferiority) appear in consciousness.

(b) *A sense of inadequacy.*—Little has been written about this result of unsatisfactory employment, though careful observers have noted it as a fundamental complaint. It is naturally often masked, and the individual seeks refuge in frank psychoneurotic complaints. The size of the problem was not widely realized before World War II, though it had been reported by a few—for example, Sandiford (1938), who was able to implement his own recommendations on his later appointment as first Director of Army Psychiatry.

There are certain other aspects of the employment which have drawn attention; notably the effects of (i) the type of unit and (ii) of the pace of work.

(i) *Incidence in different branches of the service.*—The distribution of cases in different branches of the service has been recorded by few writers. Evidence was scanty before the W.O. Enquiry (1922), but indicated that technicians in forward units might suffer unduly. James (1945) quoted that in the Middle East psychiatric cases were split up into the various branches of the service in a ratio which did not correspond to the normal distribution.

	Infantry.	Artillery.	Armoured Corps.	Other branches.	Total.
Psychiatric cases	22%	20%	12%	46%	100%
Normal strength	17%	22%	9%	52%	100%

James also commented that doctors averaged 9 per cent. of all officers admitted on psychiatric grounds.

(ii) *Changes in pace of work.*—An interesting effect on sailors of the pace of work and of changes in it is described by Curran and Garmany (1944) under the term "change of tempo." In their view the tension on life afloat developed an increased readiness and responsiveness, which persisted ashore as an anxiety state. It was emphasized that this occurred in men of apparently excellent personality, who had shown no overt signs of anxiety at sea. In the condition, there were both psychological and biological components, and it was to be regarded as an indication of a biological need to sustain the tension—that is, to make the environment suit the state of mind. A similar mechanism was presumably responsible for the occasional desires of fighter pilots and commandoes to spend their leave in excitement, e.g. on a destroyer. In fact, sedation and an early draft to sea were found to be beneficial. Symonds (1943) mentions that there is a greater tendency to delayed fear reactions among flying casualties who have to remain idle than among those who can be reoccupied at once. No doubt here an additional cause is increasing loss of confidence from absence from duty.

5. War Aims.

In morale, a fundamental factor is the soldier's faith and his conviction of the need to win. Napoleon's comment (1808), "in war the spiritual is to the material

as three to one," has been amplified by Montgomery (1945): "I call morale the great single factor in war. A high morale is based on discipline, self-respect and the confidence of the soldier in his weapons and himself." He also has no doubt of the connection of morale and health. "The morale of the Eighth Army is quite amazing. It has shown itself in a marked way in the sickness rate." In this connection may be recalled Sillman's quotation (1943) of Bermann's comment that Loyalist Spanish soldiers who had enlisted from conviction suffered less from neurosis than did conscripts.

This was, of course, well known to the great leaders of history, whose victory in the field was often determined by their methods of training months before. Their writings are taken up more with morale building than with selection. It is only in the last war that selection procedure has been even as scientific as the classic experiment of Gideon at the well of Harod (Judges, vii).

There have been commanders like Henry V, who urged all to depart who had no stomach for the fight; but they seem to have done so more as a tonic for morale than as a means of selection. On the other hand, between Joshua's "Be strong" and his trumpets at Jericho to Montgomery's "I am not interested in plans for retreat" at Alamein, there is a long record of leaders' inspiration to morale, and their success is a measure of their power to embody their followers' war aims; it matters little whether the phrases are Cromwell's in 1644 or Churchill's in 1944.

The efforts of psychiatrists to deal with the subject have been hindered a little by prejudice, which is inevitable when new methods are applied to ancient convictions. Barrett (1944) has this in mind, presumably, when he writes of the U.S.A.F., "Under certain conditions every man will welcome whatever help he can get; the popular prejudice against things of the mind is diminished or absent." Moreover, much of the earlier work of doctors was concerned with the study of unfavourable factors in the environment, and it is surprising to find that the favourable were relatively neglected. But it is on the balance between favourable and unfavourable that the individual's impression of the environment depends; to increase the one is, therefore, as important as to decrease the other.

6. *Group Relations.*

The soldier's relations to his comrades and to his leader clearly influence his personal morale. The study of group behaviour and its fundamental psychological principles is, therefore, not irrelevant, but it is impossible here to do more than outline certain of the views of eminent writers, and those will be selected which are applicable to problems of service in the Far East.

Le Bon's original study (1920) described the group as very credulous, suggestible and lacking in critical power; very simple and labile in its emotions; excited by dramatic force and repetition, rather than by logic; to be ruled by authoritative behaviour. MacDougall (1920) drew a similar picture, but went further in suggesting that the group's mental life might be raised to a higher level by five conditions, namely, continuity of existence, interaction with other groups, a definite structure leading to differentiation of numbers, traditions to regulate inter-group behaviour, and an idea in each individual of the functions of the group. Freud (1921) pointed out that these conditions were, in fact, the means of regaining for the individual his distinctiveness which he had lost on joining the group (i.e. his own continuity, his own self-consciousness, etc.).

Trotter's explanation (1916) of group behaviour was in terms of the herd instinct, but was criticized by Freud (1921), who thought it did not give the leader sufficient emphasis. Freud, therefore, substituted the term "horde" for herd. His definition of a group was "a number of individuals who had substituted one and the same object for their ego ideal, and have consequently identified themselves with one another in their ego."

It is, of course, obvious that MacDougall's conditions are present in a group such as the army; but it is less obvious to some what is really their essential nature. If Freud is correct in thinking that this depends on their success in regaining the individual's distinctiveness, then the latter point must always be borne in mind when man-management is being considered. That the soldier is a better soldier if he has some individuality of his own is a view which is in line with the findings of different work quoted above. It is not too much to suggest that its neglect is one of the particular dangers in the East.

Recently attempts have been made to translate these principles into practical advice. This has been described by several psychiatrists. The issue of outlines of lectures from officers to men (U.S. War Department, 1944) and the papers of Cohen (1944) and Freedman (1944) are examples of what is being done in the United States Army. In the British and Indian Army the subject has been regarded from the onset of the war as of supreme importance (Rees, 1943 and 1944; Main, 1943); but instruction on man-management has been more by local arrangements than by central direction. Nevertheless, psychiatrists may take some credit in the feat of maintaining morale of the vast army training in England between Dunkirk and D-day.

GENERAL SURVEYS OF LITERATURE.

Although some of the literature just surveyed deals directly with mental health in the Far East, much of it does not do so. It has, however, been selected deliberately from even more voluminous writings on the grounds that it refers to subjects which are of special significance in the East, and which deserve more direct study.

This may be clearer if a summary is made both of the direct information and of the indirect implications on points of this nature:

(i) A cross-section of psychiatric cases in the East is not the exact counterpart of one taken at home.

(ii) There is more psychosis in the East, mostly due to "schizophrenic" states, but partly to "toxic," partly to "excited" cases.

(iii) There has been a change in the distribution of types of psychoneurosis among British troops in the East in the two wars. In 1914-18 anxiety predominated among officers, hysteria in other ranks. In 1939-45 anxiety was commoner in both. There have also been increasing reports of certain somatic disorders.

(iv) The effects of enemy action have been extensively studied in the West.

(v) Domestic stress has been discussed by only a few writers, but they have done so in challenging terms.

(vi) The importance of physical factors in psychosomatic disorder is still controversial, but the trend of opinion is that the combination of physical and psychological stress is far more serious than either alone.

(vii) The emotional attitude of the individual who is exposed to any environmental stress is supremely important.

(viii) Frustration is significant, especially in staff officers and in base areas.

(ix) Changes in the tempo of activity may act as psychological strain.

(x) There is yet no general agreement about the importance of constitutional factors, nor about the best methods to assess them.

(xi) Faith and war aims are recognized to have a marked effect on mental health by successful soldiers; there are fewer accounts of this by the medical profession.

CONCLUSIONS.

This summary of the literature should be considered in conjunction with the summary of observations made earlier in this paper. In this way several points which appear at first sight unconnected take shape as part of a definite pattern.

Increase of Psychosis.

This increase, in particular in the form of manic states, has been fully discussed elsewhere (Tredgold, 1947), where an explanation was put forward in psychological terms rather than physical. A list of 23 patients was described, most of the affected being of the over-conscientious, responsible type employed on staff work calculated to increase their obsessional tendencies and anxiety. War had produced a sense of urgency; relaxations were more restricted; in staff work and base areas there was no outlet for aggression and little sense of achievement.

It is not too difficult, therefore, to regard this rise in psychosis as an indication that psychological factors are far more widely spread than generally realized, and that they affect far more than those who develop frank psychosis. Information may then be obtained both about a much wider group of psychiatric cases, and about the fluctuations in mental health of those who never report sick. The general interplay of factors which cause breakdown will first be described.

The Interplay of Factors in Individual Breakdown.

The review of literature displayed two main schools of thought—(i) that the essential factor was always an inherent defect of personality, and (ii) that external stress might occasionally overwhelm a normal individual. The work submitted here supports the latter view; but it is agreed, naturally, that in certain cases inherent defects of personality do exist. None of these defects (except dullness) is yet accurately recognized; but more success is likely to be obtained by the study of personality types than by that of psychoneurotic traits. It is thus not a mathematical problem of stress against resistance, but a more complicated one. There are, briefly, three possible explanations why some individuals break under circumstances which others surmount: (a) that their general resistance is less, (b) that their specific resistance is less, and (c) that they are affected at the same time by other adverse factors—or possibly by a lack of favourable ones. Probably each explanation is true in certain cases.

(a) Those individuals with little general resistance are those who will break down at the slightest stress. They are of little value as soldiers; their detection is a simple matter; for the machinery of selection catches most, and ensures that they are either discharged from the service forthwith, or employed only on simple duties. They are relatively few.

(b) Certain men have a specific failure of resistance, as it might be a chink in their armour. This may be innate, or be due to a wound in the personality's structure—caused by past experience (or a series of experiences), and still present as a tender scar. This has been described by Anderson (quoted above), but to illustrate it may be quoted as a typical case a soldier exposed to severe battle trauma who is given no adequate treatment; he carries with him his psychic scars, but he adapts to various stresses quite successfully till he is again exposed to battle, and immediately breaks down.

This is the explanation, not only why the soldier breaks down under stress which others tolerate, but why the behaviour of his neighbours at the time is

so important. It may in fact enlarge the chink in his armour by producing further emotional stress. The evidence for this lies in the account of the various emotions associated with physical ailments and leading to psychosomatic disorders. Controlled work on this is most difficult, but the results illustrated by incidence and by case material are very suggestive. The attitude, for instance, of the first medical officer seen, or of the commanding officer, can be paramount in determining whether or no a particular soldier surmounts his difficulties. Indeed it is within the individual experience of most of us how sympathy (or the reverse) "made all the difference." So that it is all the more surprising so little detailed study has taken place on the subject.

It is probably because this aspect of the matter has been neglected that studies of personality traits have produced such inconsistent results. The successes of prediction no doubt are the cases in whom general personality weakness is the determining factor. Their failures perhaps are those where there is a specific, but not obvious, weakness.

(c) External coincidental factors may increase the stress by sheer overwhelming effect. This occurred in a number of cases seen and the additional factors were clear enough. There is another point here—that is, the wider influences affecting the group and so each member of it. These are difficult to assess, but should not be forgotten.

Within this framework, however, the mental health of the individual may be seen at the centre of the picture, the point on which many forces converge from all sides. It is fundamental for an understanding of the picture that we should know which forces are the strongest in each case; it is also an essential preliminary if we are to design measures to maintain the mental health of the future Army—and perhaps of the future society. It is true that the stresses are different for the civilian and the soldier, but they are sometimes comparable. Moreover, as long as conscription exists, the mental health of the young man doing his military service will be of great importance to the welfare of the community.

Measures of Prevention.

The detailed design of measures of prevention is outside the scope of this work, but as the broad principles have been implied in the above discussion they will be summarized here.

If it is accepted that there is an interplay between any especial mental weakness the soldier may have, the stress he meets, and the attitude of others during and just after this stress, this should be looked for in each case, and looked for in terms of its effect on his sense of his own value, and his sense of being appreciated. If these effects happen to be of the same kind, their cumulative weight will be very severe; but if not, they will constitute only a minor strain for the individual. Whether these three are in fact of the same kind seems at present very much a matter of chance; but this need not be so, for there is no doubt that the individual's particular weakness can be discovered, and that stress likely to play on it can be predicted. It is also possible to predict the effect of certain emotional attitudes.

There are thus four lines of approach to the whole question of prevention :

1. The healing of the individual's scars. No doubt this is not easy, but it is possible, and less a problem than one which psychiatrists often undertake quite willingly—that of treating the man whose wounds have not healed at all.

2. The diminution of the effect of external stress by removing its unnecessary exaggerations. Battle inoculation has shown the way here ; careful explanation of the facts would prevent much exaggeration of homesickness or of minor physical ailments.

3. The removal of adverse emotional attitudes from men vulnerable to them. This entails instruction of how to treat our fellows rather than of how to treat ourselves, and it is, of course, particularly applicable to the young officer. It is true that, without a long acquaintance with psychology, it would not be easy to teach him how to recognize the presence and type of scars in an individual, but this is unnecessary, for it is possible to lay down certain guidance for his handling of men obviously exposed to external stress.

4. Finally, the improvement of the soldier's general mental health by appealing to those qualities which counter stresses—his faith in his cause, his confidence in his leaders, his sense of his own value, good comradeship, justice and order.

Such work, I submit, would go far to diminish the rate of psychiatric disorder—still alarmingly high in peace and in war—and also to raise the mental health of the Army and community.

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PHYSIOLOGICAL AND PSYCHOLOGICAL RESPONSES TO STRESS IN NEUROTIC PATIENTS.*

By MAXWELL JONES, M.D., M.R.C.P.E., D.P.M.

INTRODUCTION.

At the beginning of the war part of the Maudsley Hospital moved to Mill Hill School, and a neurosis centre of 550 beds was established. During the six years of war some 20,000 neurotic patients, both forces and civilian, were treated at this centre. Within the centre a special unit for the study of Forces patients with effort syndrome (E.S.) was set up. This unit was in existence from 1939 to 1945, and during this period 2,324 cases of E.S. were treated. The writer was associated with this unit throughout, working in association with a cardiologist (Paul Wood (1)), and with other psychiatrists (Lewis (2), Guttmann (3), Gillespie (4)). Much of the material brought together in this thesis has already been published (Jones (3, 5, 6, 7, 8, 9, 10, 11, 12, 38, 43)). During most of the war years the writer was in receipt of a Medical Research Council grant.

During the first world war Sir Thomas Lewis (13) made a careful study of E.S., and in 1940 he published a revised edition of his monograph; I would like to quote from the introductory remarks of this edition:

"During the last war sickness referred by medical officers of the Services to disturbances of the cardiovascular system was a chief malady. One such case was numbered for every four cases of wound. Cardiovascular disturbances followed chest complaints as the second largest group of medical ailments; it comprised in the terminology of the time two chief groups, namely, those invalided for 'disordered action of the heart' (D.A.H.), and those invalided for 'valvular disease of the heart' (V.D.H.). 'Irritable heart,' an earlier term than 'disordered action of the heart,' dates from Da Costa and the American Civil War. Da Costa believed that it led up to enlargement and failure of the heart; but time has not endorsed his view. What he described was not a disease, but a series of symptoms found in many different states. Their reference to the heart is a grave objection to each term, for it maintains among those who use it the presumption that there is a cardiac malady, and among patients each awakens serious apprehension. Because these designations were impracticable from these standpoints, and because they implied a disease, rather than a syndrome, I discarded them during the last war and introduced the more appropriate and less committal term 'effort syndrome'; the term was universally adopted in this country and is still in general use. The condition to which it refers forms the chief subject matter of this book.

"The magnitude of the problems presented by this condition, from the standpoints of army wages, invalidism, and pensioning, will be realized when it is known that not less than 70,000 soldiers had reported sick and were classed as cardiovascular by the summer of 1918; and 44,000 cases of 'effort syndrome' became pensioners. Actually, no more than one out of six of these soldiers suffered from disease of the heart; the rest were 'effort syndrome' cases. The problem is the same in this war as in the last; and, if this war continues as the last did, it will not be of much less magnitude than it was in that."

* An M. D. Thesis awarded a Gold Medal at the University of Edinburgh.

Lewis considered the etiology of E.S. to be partly physical (mainly following infections), and partly constitutional (poor physique, nervous temperament, etc.), but although admitting the importance of psychological factors he did not stress these—to quote (p. 13):

“ In my view (such) nervous symptoms are not to be regarded as parts of the ‘ effort syndrome.’ They are certainly not essential to it, for most cases are without them; they are added to the syndrome, and are of sufficient frequency to leaven the whole group. A matter more relevant to the present discussion is to know if the symptoms properly belonging to the ‘ effort syndrome,’ namely, persistently increased heart rate and blood pressure, and exaggerated breathlessness on effort, can arise directly out of anxiety states; it seems probable that they can, and that abnormal anxiety must be regarded as a real and important contributing cause in given patients.”

Physiological studies by Lewis and his collaborators (16, 17, 18), by Haldane and his associates (19, 20, 21) and by Briggs (22) demonstrated clearly that E.S. patients responded poorly to exercise, and showed various physiological anomalies, but the etiology of the condition still remained obscure.

Between the two wars little was done to study the problem, but in 1937 Hick *et al.* (24) brought forward impressive evidence in support of Haldane's earlier suggestion that the symptoms of E.S. were due to anoxaemia of effort, and in 1938 Soley and Shock (23) suggested that the symptoms of E.S. were due to hyperventilation alkalosis.

When we started to study the problem of E.S. there were two main schools of thought, the cardiologists (Lewis (13), Parkinson (14), White (15)), who still felt that the etiology of E.S. when not due to definite organic factors was unknown, and the psychiatrists, who were inclined to deny the existence of E.S. as an entity, and thought of it as a particular form of anxiety state. The cardiologist's point of view is well expressed by Parkinson (14). Speaking of E.S. he states:

“ Its true nature is not yet known, but the full picture which bulks in war is only sporadically encountered in peace-time. Tentatively, I would define Effort Syndrome as a functional circulatory disease, most evident on exertion, unmasked or produced by war service. It is hoped that the experience of this war will provide a better name, a more satisfactory definition, and a clearer understanding of this condition.” . . . “ In the present war, conditions so far seem to have produced a preponderance of the psychoneurotic type, and a greater proportion of those who had similar symptoms in civil life. Indeed, some current opinion is inclined to the view that effort syndrome is simply a psychoneurosis. It is not certain how far this definition will carry us, because the term can be so readily applied to any form of ill-health which is imperfectly understood and unaccompanied by organic signs. After all, psychological variations and faults in healthy people are common enough. It could only be a bar to medical progress if psychoneurosis (or psycho-somatic disease) remained a label and became a dumping ground for most unexplained illness, much as did ‘ Neurasthenia ’ in the past. It is still to be decided how far psychotherapy is rational and effective treatment; besides, an explanation for the predominance of circulatory symptoms, the relation to effort, and the relative uniformity of the clinical picture is not yet forthcoming. Certainly the time is ripe not only for psychological but for other investigations, as it would appear that autonomic, nervous, endocrine, respiratory and metabolic factors may also operate in effort syndrome, and will also engage the attention of the physician seeking a wider conception of its essential features. Doubtless this expanded approach has much to commend it, and will deepen and broaden our vision of what is at present obscure in the rationale of Effort Syndrome.”

The E.S. unit at Mill Hill started at the end of 1939 with a psychiatrist and a cardiologist working in collaboration. We had no fixed view-point, although each worker naturally approached the problem in a somewhat different manner, determined partly by his own personality and training. The cardiologist (Paul Wood) remained with us for eighteen months, at the end of which time he had decided that the problem was a psychiatric and not a cardiological one. In his Goulstonian lectures (i) he stated :

" It is urged that the diagnosis of ' effort syndrome ' be dropped ; a proper psychiatric diagnosis is nearly always available ; if attention is called to the presence of effort intolerance, let effort intolerance be added in brackets."

From the psychiatric point of view there was no advantage in retaining the diagnosis of effort syndrome, and as the war progressed the number of cases sent into Mill Hill by the army psychiatrists with this diagnosis progressively diminished—732 in 1940 ; 650 in 1941 ; 531 in 1942 ; 220 in 1943 ; 99 in 1944. There was no reason to suppose that the syndrome had become less frequent, but presumably familiar psychiatric diagnoses were being used instead.

The growing realization that E.S. was not an entity did not diminish our interest in the subject of effort intolerance, or in the various anomalies of vegetative function found in these cases. It was still far from clear what the effort intolerance was due to, or how this disability could be measured objectively (if indeed it was present at all).

This thesis is concerned mainly with a study of some of the physiological functions of neurotic cases with effort intolerance. It is convenient for research purposes to retain the use of the term " effort syndrome " (E.S.) to indicate cases with effort intolerance as distinct from other types of neuroses—the alternative would have been to use the psychiatric diagnosis and add " with effort intolerance " in brackets.

The term effort syndrome, as used here, refers to a relatively excessive response to effort as manifested by breathlessness, palpitation, and subjective feeling of fatigue on even mild exercise, along with excessive vegetative lability on emotional excitement, e.g. sweating, palpitation, giddiness, etc., as described by the patient or objectively observed. If there is a known organic cause then that diagnosis is, of course, used in preference to the term effort syndrome. " Syndrome " is a descriptive term generally used to avoid premature aetiological conception ; there is apparently no common aetiology to E.S. ; and as a descriptive term is generally favoured, the American preference for the term " neurocirculatory asthenia " seems reasonable.

In the majority of E.S. patients seen here, constitutional (including personality) factors would appear to be more important than psychogenic factors ; thus when a breakdown occurs there may be no pronounced affective disorder, and no adequate psychopathology to explain the illness. From this it follows that existing psychiatric classifications, based on aetiological or descriptive grounds, would be difficult to apply. It therefore seems reasonable to use a classification which takes into account constitution and personality more fully than do existing classifications. One can divide the E.S. material into three broad groups :

(1) Where the poor physical endowment is the primary factor in producing symptoms. Here we are simply dealing with a poor machine, which shows excessive response to physical effort. Here the patient has effort intolerance which has been present since earliest recollection.

(2) As above, but the patient responds in a neurotic manner to his constitutional inferiority. In this sense there is a psychological aetiology, but the constitutional factor is the basic one. The emotional reaction may take any form, depending on the personality, and may simply amount to displeasure. Here the patient feels that he has an effort intolerance, but his disability may actually be less than he believes it to be. Such patients usually give a history of effort intolerance since childhood, but the mere disability of Group 1 frequently changes under stress to the neurotic attitude of Group 2.

(3) Primarily neurotic. Here the usual aetiological factors determining a neurosis will apply. The form may be determined by the constitutional physical inferiority which, if present, colours the whole picture, but is of only secondary importance; or it may be wholly psychogenically determined. Such "illness" tends in our experience to be of comparatively recent origin, and is particularly prone to result from the emotional and physical stresses of wartime.

By neurosis is meant an upset of the normal harmonious functioning of the mind and body resulting from some personal inadequacy to meet a psychological situation or problem. Poor general health, weak physical constitution, low intelligence, etc., may predispose to such a neurosis, but these are in themselves not enough; the individual has failed to meet the demands of his environment or of his conscience, and a conflict has been set up. Thus, the Group 1 E.S. has the symptomatology of the other two groups, but his physical limitation has been satisfactorily met and presents no handicap, so he has no neurosis. The opposite is true of Group 2 E.S.

This division into three groups of E.S. proved convenient, but unfortunately only an occasional group 1 E.S. was seen (from the definition it is clear that they would only be discovered when examining a large random sample of controls because they do not regard themselves as ill, and therefore would not report sick), and no detailed study of this group has been possible.

PROBLEMS STUDIED IN THIS THESIS.

1. Had the E.S. patients a poor exercise response compared with a normal control group? Judged by the subjective accounts of E.S. patients there was a real disability, but could this be assessed objectively?

2. What method or methods were most suitable for demonstrating objectively this disability (if present)?

3. As E.S. was not a psychiatric entity, it was important to compare neurotic patients showing poor exercise response with other neurotic patients not complaining of this disability. Poor exercise response might be closely correlated with neuroses showing anomalies of vegetative function—e.g. somatic anxiety symptoms—or might be an attribute of neuroticism in general.

4. How important was the subjective attitude to physical work in the E.S. patient? Does he in fact have any effort phobia?

5. How did E.S. and other neurotic patients respond to stresses other than physical exercise—e.g. cold, pain, emotional excitement, and persistence?

6. As the ultimate aim of all research in medicine must be the benefit of the patient, how did the facts elicited influence the treatment of poor exercise response in neurotic patients, and of certain other types of neurotic patients not complaining of effort intolerance?

(As most of the statistics worked out in this thesis are based on small samples (20 or less) we have regarded $P < 0.01$ as significant and $P < 0.05$ as probably significant.)

RESPONSE TO STRESS.

I. EXERCISE RESPONSE.

Under this heading are included four different degrees of stress:

(a) *Standard work*, which represents moderately hard work (6,750 ft.lb. of work per min.).

(b) *Maximal work*, which means working to complete exhaustion.

(c) *Light work* (4,500 ft.lb. of work per min.).

(d) *Minimal work*.—Virtually no work being done by the subject.

(a) STANDARD WORK.

An ergometer was made by adapting an old bicycle and fracture bed (see Fig. 1).

The ergometer consisted of a bicycle chain wheel and pedals connected by the frame to the ground wheel, which had a friction band with weights and a

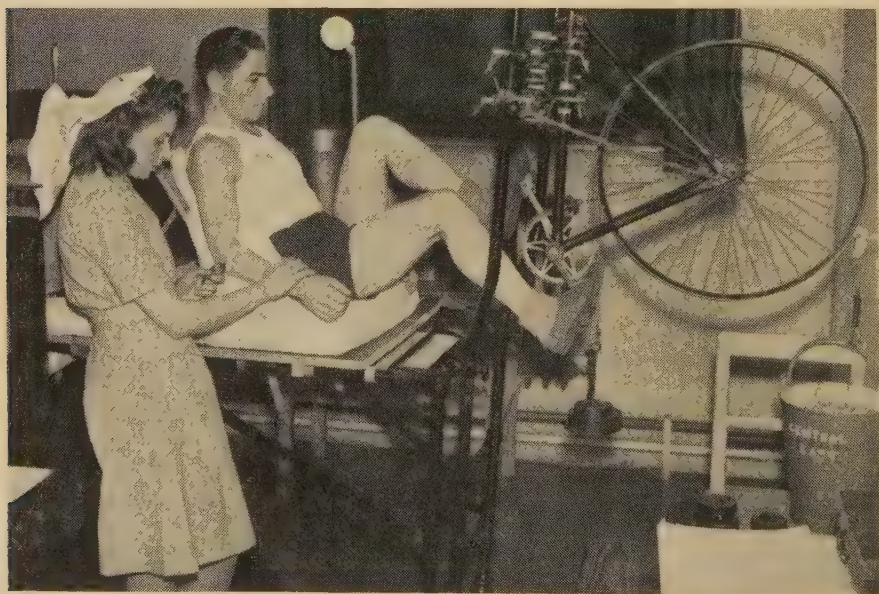


FIG. 1.—Showing bicycle ergometer and position adopted when cycling.

spring balance. The whole was supported by two uprights off the end of the bed so that the subject could pedal as he lay on the bed ; though unorthodox the position was comfortable, and facilitated the collection of blood samples. We have used a standard exercise throughout, pedalling at 42 revolutions per minute, the friction of the brake band being equivalent to a weight of 9 lb., and the subject doing 6,750 ft.lb. of work per minute for five minutes. In deciding on the amount of work to be done for the standard exercise we chose the heaviest work which could be done satisfactorily by the worst of the E.S. material.

1. *Pulse Response to Standard Work.*

Material.—For this study we used a random sample of 20 healthy men from a nearby barracks. They were all tradesmen (fitters), and in good health at the time of testing. None had a past history of serious illness affecting the respiratory or circulatory systems. Each had a short interview with the psychiatrist and none showed any evidence of frank neurosis. Their weights ranged from 120 to 154 lb. with a mean of 143.4 lb. Their ages ranged from 18 to 35 with a mean of 24.7.

Ten patients with a characteristic history of E.S. and 10 patients with anxiety states and somatic anxiety symptoms but no complaint of poor exercise response were chosen. Six of the E.S. patients described effort intolerance and symptoms of excessive vegetative lability on excitement since childhood (Group 2 E.S.). In the remaining four E.S. patients their symptoms dated from recent years—during army service (Group 3 E.S.). All 20 patients were free from any demonstrable organic disease, and had no history of serious respiratory or circulatory illness at any time in their lives. The E.S. patients' weights ranged from 132 to 164 lb. with a mean of 143.6 lb., and their ages ranged from 24 to 36 with a mean of 29. The comparable figures for the anxiety states were 133 to 161 lb. with a mean of 143.9 lb., and 23 to 36 with a mean of 30 years.

The controls, being craftsmen, were leading relatively sedentary lives, and had less physical training, marching, etc., than the patients.

Method.—Standard work on the bicycle ergometer was used. The subjects did the tests on three successive days before any recorded test was made. Many attempts have been made to devise a reliable test of physical efficiency from the pulse response after exercise. This method, however, can never be very accurate, as cardiac rate is only one factor which determines cardiac output, the latter being what one would really like to measure. However, after moderate or severe physical exercise, a characteristic curve is obtained in which the major pulse decrement occurs within the first four minutes, and then flattens out rapidly.

Our procedure has been to count the pulse rate for a full minute for the ten successive minutes immediately following the cessation of exercise. The test was always repeated on successive days. Much trouble was taken to ensure standard conditions, and if necessary the subject rested more than 30 minutes before starting exercise if there was any difficulty in obtaining a constant resting pulse rate. Table I shows the re-test reliability (rank corre-

lation) of various ways of expressing the pulse response to standard work on successive days. The E.S. patients and anxiety states are taken together as one group of 20. It will be seen that the resting pulse and peak pulse (for the minutes immediately after the cessation of exercise) correlate better in the E.S. plus anxiety groups (resting $\rho = 0.813 \pm 0.076$ SE; peak $\rho = 0.724 \pm 0.103$ SE) than in the controls (resting $\rho = 0.605 \pm 0.142$ SE; peak $\rho = 0.512 \pm 0.165$ SE).

Of the various ways of expressing the pulse figures shown in Table I no one method gives an outstandingly high correlation in both controls and E.S. plus anxiety states. We have paid more attention to one method which we have called the "Pulse Area" than the other methods available because it takes more account of the physiological changes occurring throughout the recovery period. It is obtained by adding the pulse figure for the first four minutes after the cessation of exercise, and the mean of the last three minutes counted (8, 9, and 10 minutes) and subtracting five times the resting pulse (see Table I, Method 6). We have used it for some years now, and believe it to be the most accurate method of expressing the pulse response to moderate exercise.

TABLE I.—*Coefficient of Correlation for Pulse Response (Treated in Various Ways) to Standard Work, Performed on Two Successive Days.*

	20 normal controls.		20 E.S. + anxiety states.	
	Correlation coefficient.	Standard error.	Correlation coefficient.	Standard error.
1. Resting pulse	0.605	0.142	0.813	0.076
2. First minute post exercise	0.512	0.165	0.724	0.103
3. Second minute post exercise	0.536	0.159	0.691	0.117
4. Third minute post exercise	0.514	0.165	0.692	0.117
5. Resting pulse minus first minute post exercise	0.382	0.191	0.564	0.153
6. 1, 2, 3, 4, 9 minutes minus resting pulse $\times 5$	0.665	0.125	0.512	0.165
7. 1, 2, 3, 4, 9 minutes minus resting pulse	0.581	0.148	0.550	0.156
8. 1, 9 minutes minus resting pulse $\times 2$	0.512	0.165	0.462	0.175
9. 1, 2, 3, 4, 9 minutes post exercise	0.562	0.153	0.667	0.124

Results.—Fig. 2 shows graphically the pulse response of the various groups to standard work. All figures represent the mean of two tests done on successive days. For the 20 normal controls, the mean resting pulse was 67, and the mean pulse figures for the first four minutes after standard work were 100, 82, 81, 79. The means of the eighth, ninth and tenth after exercise were added together and averaged, the figure obtained being 76. The corresponding figures obtained for the 10 E.S. patients were 73, 121, 106, 100, 95, and 85, and for the 10 anxiety states, 72, 110, 97, 91, 88, and 84. Fig. 2 shows how, when the results are plotted, the curves of the three groups are almost parallel. The greater pulse rise immediately after exercise in the E.S. patients and anxiety states compared with the controls are maintained, and result in a much slower decrement.

The "Pulse Area" (see Method) is probably the best method for quantitating the pulse figures after standard work. It is obtained by adding the

five pulse figures—the first four minutes after exercise and the mean of the eighth, ninth, and tenth minutes—and subtracting five times the resting pulse. The difference between the controls and E.S. patients for the mean pulse area is significant (critical ratio (c.r.) 4.4; $P < .01$). The mean pulse area for the controls is 85.35 ± 36.0 s.d., while that for the 10 E.S. patients is 150.7 ± 36.73 s.d. The difference between controls and the 10 anxiety states is less marked (c.r. 2.08; $P < .05$). The mean pulse area for the anxiety states was 116.45 ± 34.7 s.d. Comparing the controls with the 10 E.S. patients plus the 10 anxiety states, significant difference is again obtained (c.r. 3.95; $P < .01$), the mean pulse area for the 20 patients being 135 ± 40.69 s.d.

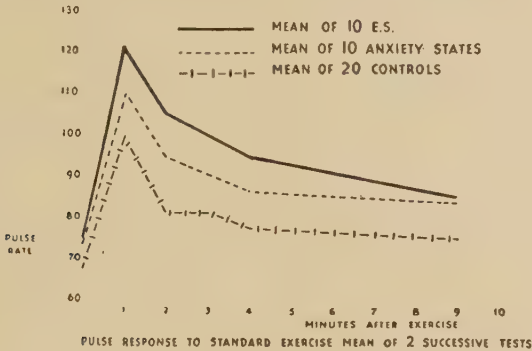


FIG. 2.

The above group of 20 normal controls, 10 anxiety states with somatic symptoms but no complaint of effort intolerance and 10 E.S. patients, were enlarged to form a group of 12 Group 2 effort syndromes (i.e., cases with a lifelong history of poor exercise response and excessive vegetative lability on excitement): 15 Group 3 effort syndromes (i.e. patients whose effort intolerance has developed as part of a neurosis, in contrast to the more “constitutional” Group 2 effort syndrome); 10 patients with mild anxiety states of a chronic nature who had no somatic anxiety symptoms, and no complaint of effort intolerance; 12 cases with conversion hysteria of the more chronic type with no clinical evidence of anxiety.

TABLE II.—Significance of the Difference of the Means in Pulse Area Between the Normal Control Group and Five Different Groups of Neurotic Patients for Five Minutes Immediately Post (Standard) Exercise.

	Mean pulse area.	S.D.	C.R.	P.
20 normal controls	86 .	35.8 .	— .	—
12 E.S. Group 2	145 .	30.6 .	4.9 .	<0.01
15 E.S. Group 3	150 .	66.3 .	3.3 .	<0.01
10 somatic anxiety	116 .	34.7 .	2.1 .	<0.03
12 hysterics	100 .	30.5 .	1.1 .	<0.15
10 anxiety states	166 .	33.2 .	5.8 .	<0.01
Total 59 neurotics	136 .	42.7 .	5.0 .	<0.01

Results.

Pulse Area.—As will be seen from Table II, the group of hysterics (c.r. 1.1; $P < 0.1$), does not appear to differ significantly from the normal controls. The most striking differences are found in the anxiety states (c.r. 5.8; $P < 0.1$), and in the E.S. Group 2 (c.r. 4.9; $P < 0.1$). The mean pulse area for the 20 controls was 86 ± 35.8 s.d., and for the total 59 neurotic patients 136 ± 42.7 s.d. (c.r. 5.0; $P < 0.1$).

2. Metabolic Response to Standard Work.

The choice of method for measuring the metabolic increase brought about by exercise presents very great difficulties. Knipping (26) believes that the most satisfactory technique is to use a spirometer to which O_2 is added at the rate sufficient to keep the level of the spirometer constant. The rate of O_2 inflow into the closed circuit then equals the O_2 consumption. He increases the work load progressively until the maximum rate of O_2 intake is reached: this value is reached after two or three minutes and the work is interrupted after another two or three minutes. We experimented with this technique but were unable to have a satisfactory apparatus built in wartime, and in any case, when using an improvised machine, found that it was unsatisfactory to have neurotic patients breathing into a closed circuit during exercise.

Ideally, one would like to compare the efficiency of muscular work in the three groups we have studied. Simonson and Enzer (27) in their excellent review of the physiology of muscular exercise and fatigue in disease discuss the whole problem adequately. The "coefficient of efficiency" $\frac{W}{E_w - R}$ (W = amount of work done; E_w = the total energy expenditure; R = the energy expenditure during rest) may be determined by two methods: (a) by measuring the excess energy expenditure from the beginning of the work until the end of recovery and relating it to the total amount of work done; (b) by allowing the subject to exercise until a steady state is reached (after three to five minutes of exercise, when the body "pays as it goes," and no further oxygen debt is incurred—i.e. anaerobic and aerobic processes are balanced), and then measuring the excess oxygen uptake per minute during this state and relating it to the amount of work done per minute. However, neither of these methods was suitable for our purpose: first, because to keep a mouthpiece and nose clip in position continually during the five minutes' standard exercise, and for a further ten to twenty minutes post exercise, would be impracticable with neurotic subjects; second, because the standard exercise used was too heavy to allow a steady state to develop in most of the patients. Finally, the possibility of measuring the entire oxygen debt was given up mainly because of the difficulty in deciding when the oxygen uptake had fallen to the resting metabolic rate. We have measured the O_2 uptake for only five minutes post exercise, by which time, of course, the oxygen debt had not been fully repaid; however, the oxygen consumption decreases abruptly during the beginning of recovery, and by far the major portion of the decrease has occurred within the first five minutes post exercise, only a negligible decrease

occurring during the next five minutes. This is illustrated by the following mean figures of O_2 uptake per minute obtained for 3 E.S. patients doing standard work: resting 288 c.c., two to three minutes from start of exercise 1,529 c.c.; four to five minutes from start of exercise 1,824 c.c.; one to two minutes post exercise 1,439 c.c.; four to five minutes post exercise 431 c.c.; nine to ten minutes post exercise 399 c.c. We fully realize that taking only this five minutes post exercise period is open to criticism, but believe that by attempting a more exact (and exacting) technique with neurotics we would have defeated our own purpose by increasing the risk of provoking emotional reactions.

For the actual test the patient was rested for half an hour before exercising.

The subject then cycled for five minutes as above, and 15 seconds before the completion of exercise the mouthpiece of the Douglas bag was inserted and a nose clip applied. At the completion of the five minutes' cycling the tap leading into the Douglas bag was opened, and the expired air collected for the five minutes immediately post exercise. Two Douglas bags connected by a three-way tap were used, and expired air collected in one bag for the first 90 seconds, and collected in the other bag for the remaining three and a half minutes. During this five minutes post exercise period the respirations per minute were counted. The whole procedure was carried out in detail for four consecutive days prior to testing in order to familiarize the subject with the method.

The Douglas bags were well shaken to ensure mixing of the expired air, and a sample of each bag was withdrawn through a Brodie Gas Sampler. Duplicate samples from each gas sampler were analysed in a Haldane Gas analyser. These duplicate determinations agreed within 0.04 per cent. for O_2 and 0.03 per cent. for CO_2 . Frequent analyses were made on atmospheric air, checking 20.94 for the combined CO_2 , and O_2 determinations within 0.03 per cent. The mercury levelling bulb on the Haldane analyser had an automatic lowering and raising device run by a small motor.

For 20 subjects the complete test was repeated on three successive occasions to establish the reliability of the method. The intercorrelation of the three means gave a reliability for the O_2 consumption, $r = 0.75$. These figures indicated that the reliability of repeated testing of the same subject with O_2 assays was sufficiently good to justify only one test being performed. This meant a great economy of time.

Material.—The subjects used for this study were the same as the first group tested for pulse response to standard work.

Results.

Oxygen uptake after standard exercise.—Fig. 3 shows the O_2 uptake after exercise for the three groups, 20 normal controls, 10 E.S. patients and 10 anxiety states. The volumes represent the mean O_2 uptake per minute for the five minutes post exercise during which the expired air was collected in the Douglas Bags. Obviously the O_2 uptake during these five minutes is rapidly falling as the O_2 debt is repaid, but for comparative purposes the mean O_2 uptake per minute is the most convenient to use. Table III gives the same results in more detail. The volumes given for the normal controls

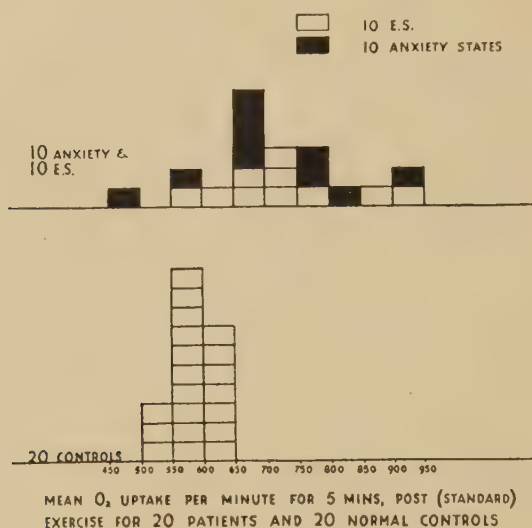


FIG. 3.

are obtained from a single test; those from the patients are the mean of three tests done on successive days.

TABLE III.—O₂ Uptake in Cubic Centimetres Per Minute after Standard Work.

	Range.	Mean.	S.D.
20 normal controls	533 to 638	586	35.9
10 E.S. patients	581 to 923	729	109.0
10 anxiety states	470 to 901	702	126.0
10 E.S. + 10 anxiety states	470 to 923	716	118.2

The mean O₂ uptake per minute for the 20 controls is 586 c.c. $\pm$ 35.9 s.d. (range 533 to 638). The mean of the 10 E.S. patients is 729 $\pm$ 109.0 s.d. (range 581 to 923), and for the anxiety states 702 $\pm$ 126.0 s.d. (range 470 to 901). When the E.S. patients and anxiety states are added together, the mean O₂ uptake is 716 $\pm$ 118.2 s.d. (range 470 to 923).

The difference between the E.S. patients and the normal controls is significant (c.r. 3.83; $P < .01$), and probably significant for the difference between anxiety states and controls (c.r. 2.53; $P < .02$). The difference between E.S. patients plus anxiety states and controls is significant (c.r. 4.58; $P < .01$).

When the above group of 20 normal controls and 10 E.S. + 10 anxiety states was enlarged to include other groups of neurotics as described under pulse response to standard work, the following results were obtained:

Table IV shows the mean oxygen uptake for the five minutes post exercise in the normal controls and five neurotic groups tested. It will be seen that all five groups of neurotics show a significantly greater oxygen uptake per minute than do the normal controls. The difference is most marked in Group 3 E.S. (c.r. 4.2; $P < .01$), and in the E.S. Group 2 (c.r. 4.2; $P < .01$), and

TABLE IV.—*Significance of the Difference of the Means in Oxygen Uptake Between the Normal Control Group and Five Different Groups of Neurotic Patients for Five Minutes Immediately Post (Standard) Exercise.*

	Oxygen uptake.			
	c.c.'s per minute.	S.D.	C.R.	P.
20 normal controls . . .	586	35.9	—	—
12 E.S. Group 2 . . .	718	101.1	4.2	< .01
15 E.S. Group 3 . . .	673	70.5	4.2	< .01
10 somatic anxiety . . .	703	126.0	2.7	< .02
12 hysterics . . .	654	51.5	3.9	< .01
10 anxiety states . . .	683	84.0	3.3	< .01
Total 59 neurotics . . .	685	86.2	7.1	< .01

least striking in the somatic anxiety group (c.r. 2.7; $P < .02$). The mean oxygen uptake for the 20 controls is 586 c.c. per minute $\pm$ 35.9 s.d., and for the total 59 neurotic patients 685 c.c. per minute $\pm$ 86.2 s.d. (c.r. 7.1).

3. Lactate Rise after Standard Work.

Method.—Standard work on a bicycle ergometer was carried out as previously described. A sample of venous blood was removed for lactate determination.

(a) While the subject was resting and (b) ten minutes after completion of the standard exercise.

The blood samples were analysed for lactate content, the ten-minute sample representing the time when the lactate was probably at its peak. There is a lag in the disappearance of lactate after exercise, which in the trained subject may last for six to eight minutes, but in the untrained or non-athletic subject may last two or three times as long (28).

The blood samples were drawn into tubes containing a small amount of mixture of potassium oxalate and sodium fluoride ground up together in the proportion of 1:10. The latter was to prevent the lactic acid from decomposing. Determinations were made in duplicate following Friedmann's method (29). The treatment of the filtrate with CuSO_4 and Ca(OH)_2 was omitted as suggested for normal human blood (29). The oxidizing agent used in the aeration procedure was $\text{N} \cdot 10 \text{ KMnO}_4$. Acceptable determinations had blanks of not more than 0.1 c.c. of 0.002N. I_2 and the duplicates agreed within 0.05 c.c. of 0.002N. I_2 .

In testing the E.S. patients and the anxiety states, the complete test was repeated on three successive occasions to establish the reliability of the method. The intercorrelation of the three means for the lactate rise gave a reliability $r = 0.96$. These figures indicated that the reliability of repeated testing of the same subject with lactate assays was sufficiently good to justify only one test being performed.

Using the same 20 normal controls 10 E.S. and 10 anxiety states previously

described under pulse response and metabolic response to standard work the following results were obtained :

TABLE V.—*Blood Lactate Rise Above the Resting Level Following Standard Work, Expressed in Milligrammes Per Cent.*

	Range.	Mean.	S.D.
20 normal controls	3 to 22	11.1	6.3
10 E.S. patients	8 to 35	21.4	8.6
10 anxiety states	0 to 27	15.9	7.8
10 E.S. and 10 anxiety states	0 to 35	18.6	8.4

Results.—Table V gives the blood lactate rise after exercise in the three groups—controls, anxiety states and E.S. patients. The 20 controls gave a mean lactate rise of 11.1 mgm. per cent. $\pm$ 6.3 s.d., the 10 E.S. patients a mean lactate rise of 21.4 mgm. per cent. $\pm$ 8.6 s.d., the 10 anxiety states a mean lactate rise of 15.9 mgm. per cent. $\pm$ 7.8 s.d., and the 10 E.S. patients plus 10 anxiety states a mean lactate rise of 18.6 mgm. per cent. $\pm$ 8.4 s.d.

The difference between the controls and the E.S. patients (c.r. 3.12 ; $P < .01$), and the controls and E.S. patients plus anxiety states (c.r. 3.32 ; $P < .01$) is significant, but the comparison between the controls and the anxiety states is not significant (c.r. 1.64 ; $P < 0.1$). Of the 10 E.S. patients, 6 had a lactate rise greater than the highest control rise (22 mgm. per cent.), while only one of the anxiety states showed a rise above this figure.

When the above groups are enlarged to include larger groups of neurotic patients the following results are obtained :

TABLE VI.—*Significance of the Difference of the Means in Lactate Rise Between the Normal Control Group and Five Different Groups of Neurotic Patients for Five Minutes Immediately after (Standard) Exercise.*

	Lactate rise.			
	Mgm. %	S.D.	C.R.	P.
20 normal controls	11.1	6.2	—	—
12 E.S. Group 2	18.0	6.9	2.8	$< .01$
15 E.S. Group 3	19.9	8.8	3.1	$< .01$
10 somatic anxiety	15.8	7.8	1.6	$< .1$
12 hysterics	15.0	6.2	1.6	$< .1$
10 anxiety states	19.2	7.4	2.8	$< .01$
Total 59 neurotics	17.7	7.7	3.8	$< .01$

Table VI shows the mean lactate rise following standard exercise. Both groups of E.S. show significant differences (E.S. Group 3, c.r. 3.1 ; $P < .01$, E.S. Group 2, c.r. 2.8 ; $P < .01$), and the anxiety states are also significantly different (c.r. 2.8 ; $P < .01$). The somatic anxiety states (c.r. 1.6 ; $P < .1$) and the hysterics (c.r. 1.6 ; $P < .1$) do not appear to be significantly different from the normal controls. The mean lactate rise for the 20 controls is 11.1 mgm.

per cent. ± 6.2 s.d., and for the total 59 neurotic patients 17.7 mgm. per cent. ± 17.1 (c.r. 3.8).

4. Ventilation after Standard Work.

TABLE VII.—*Ventilation Responses for the Five Minutes Immediately Following Standard Work. By Oxygen Equivalent is meant the Amount of Ventilation Required for the Assimilation of 100 c.c. of Oxygen.*

	Breaths per minute.	Litres per minute.	O ₂ uptake per minute. (c.c.'s.)	Oxygen equivalent.	O ₂ uptake per breath. (c.c.'s.)	Volume per breath. (c.c.'s.)
20 controls . . .	18.3	17.0	586	2.901	34.1	929
10 E.S. patients . . .	30.6	30.5	729	4.184	26.0	996
10 anxiety states . . .	26.7	26.0	702	3.704	31.6	974
E.S. plus anxiety states.	28.7	28.3	716	3.944	28.8	985

Table VII shows the essential factors regarding the post exercise ventilation in the patients and controls. It will be seen that for the five minutes post exercise, the mean respiratory rate per minute was 18.3 for the controls, 30.6 for the E.S. patients, and 26.7 for the anxiety states. The mean ventilation in litres per minute for the three groups was 17.0 l, 30.5 l, and 26.0 l respectively. As the mean oxygen uptake per minute for the three groups was 586 c.c., 729 c.c., and 702 c.c. respectively, the post exercise oxygen equivalent (i.e. the ventilation required for the assimilation of 100 c.c. of oxygen) was 2.9 for the controls, 4.2 for the E.S. patients, and 3.7 for the anxiety states. The oxygen uptake per breath was 34.1 c.c., 26.0 c.c., and 31.6 c.c. respectively for the three groups, and the volume per breath 929 c.c., 996 c.c., and 974 c.c. respectively in the controls, E.S. patients, and anxiety states.

TABLE VIII.—*Significance of the Difference between the Means (c.r.) of Pulse Area, Blood Lactate Rise and Metabolic Response to Standard Work by Various Groups of Neurotic Subjects, Compared with a Control Group of 20 Normal Subjects.*

	Pulse area.			Lactate rise.			O ₂ uptake.	
	C.R.	P.		C.R.	P.		C.R.	P.
12 E.S. Group 2 . . .	4.9	<.01	.	2.8	<.01	.	4.2	<.01
15 E.S. Group 3 . . .	3.3	<.01	.	3.1	<.01	.	4.2	<.01
10 somatic anxiety . . .	2.1	<.04	.	1.6	<.1	.	2.7	<.02
12 hysterics . . .	1.1	<.1	.	1.6	<.1	.	3.9	<.01
10 chronic anxiety . . .	5.8	<.01	.	2.8	<.01	.	3.3	<.01
Total 59 neurotics . . .	5.0	<.01	.	3.8	<.01	.	7.1	<.01

Discussion on the Response to Standard Work.

From the results obtained (Table VIII) it is clear that a significant differentiation between the exercise response of normal controls and E.S. patients (both Group 2 and Group 3) can be made in the three tests—pulse area, O₂ uptake, and lactate rise. There is also a significant differentiation on all

three tests between the controls and the chronic anxiety states who had no somatic anxiety symptoms and made no complaint of poor exercise response. The difference between the controls and somatic anxiety states on the same three tests is probably significant, except in the case of the lactate rise—(c.r. 1.64; $P < .1$). The somatic anxiety states had symptoms similar to those complained of by the E.S. patients, and apparently due to autonomic over-activity; the chronic anxiety states, on the other hand, had no such symptoms, although these had been present in the more acute stage of their illnesses; nevertheless the E.S. patients and chronic anxiety states showed poorer exercise response in our tests than did the somatic anxiety states. This suggests that autonomic overactivity alone was not responsible for poor exercise response. The group of hysterics approximated more to the control group, but the total group of 59 neurotics was sharply differentiated from the control group on all three tests.

Post-exercise ventilation showed no evidence of deficient ventilation: the volume per breath was approximately equal in the controls, E.S. patients, and anxiety states, but in both groups of patients more ventilation was necessary for the assimilation of 100 c.c. of oxygen than in the controls. In other words, the patients breathed less efficiently than the controls.

(b) MAXIMAL WORK.

The bicycle ergometer as already described was used.

The procedure was similar to that adopted for the standard work experiments except that the subject was now asked to work to complete exhaustion, and an attempt was made to achieve this within ten minutes by choosing a suitable weight to start with, and if necessary adding further weights while the patient was actually pedalling. In view of the fact that no standard weight was used, no comparison of the amount of work done by the various subjects was possible. Actually, the E.S. patients, in the large majority of cases, reached their end-point within the ten-minute period when doing work equivalent to 6,750 ft.lb. per minute, i.e. the same work level as was used for the standard work. The controls invariably needed considerably more weight on the friction band.

It is fully realized that the "end-point" must be an arbitrary one, dependent at least as much on psychological factors as on the physiological changes occurring as a result of physical work. All that can be said is that the conditions were standardized, and every encouragement given to the subject to produce his best performance.

Twenty normal controls and 20 E.S. patients (8 Group 3 and 12 Group 2) were tested.

1. *Pulse Response to Maximal Work.*

The mean pulse rates for the resting pulse, the first four minutes after exercise, and the average of the eight to ten-minutes period following maximal work were as follows: controls, 70, 156, 131, 119, 113, and 104; patients, 71, 154, 134, 125, 119, and 106. Fig. 4 shows how closely the pulse curve of the controls and patients now correspond.

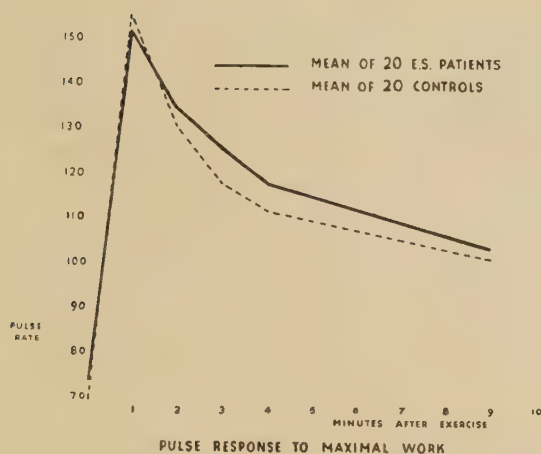


FIG. 4.

2. Blood Lactate Rise following Maximal Work.

As in the standard work, a blood sample for lactate estimation was removed at rest, and ten minutes after the cessation of exercise.

In the 20 controls the mean lactate rise was 78.0 mgm. per cent. $\pm$ 16.3 s.d. (the mean resting value was 11.2 mgm. per cent. $\pm$ 2.79 s.d., and the mean maximal figure was 89.2 mgm. per cent. $\pm$ 17.01 s.d.).

The 20 E.S. patients gave a mean rise of lactate from the resting level 50.2 mgm. per cent. $\pm$ 11.06 s.d. (mean resting level 12.6 mgm. per cent. $\pm$ 3.1 s.d., and mean maximal figure 62.8 mgm. per cent. $\pm$ 11.28 s.d.). The difference between the means (c.r.) is significant, being 6.22 ($P < .01$).

Of these 20 patients, 8 belonged to Group 3 E.S., and 12 to Group 2 E.S. Both groups gave almost similar results, the mean maximal lactate rise being 48.0 mgm. per cent. in Group 3 and 51.1 mgm. per cent. in Group 2.

3. Blood Gas Analysis and pH.

Material and Technique.

A group of 10 Group 2 E.S. patients was chosen, all of whom were free from organic disease and had ages ranging from 25 to 31. They all gave a history of effort intolerance from earliest recollection, and it was felt that constitutional physical inferiority was more important in these men, and had more to do with their excessive response to exertion than had emotional factors.

A group of 16 controls was taken from the available hospital staff, and included 7 doctors, none of whom took any regular exercise, 4 members of the physical training staff, and 5 others of whom two did a certain amount of track running.

Blood samples were taken from the subject at rest, immediately after the cessation of exercise, to give the pH and lactate picture at the exhaustion point, and a third sample five to ten minutes later to give the maximum lactate figure, and also to determine the behaviour of carbon dioxide during recovery. The first and third samples were arterial blood taken from the

femoral artery of each leg. The second sample was arterialized venous blood from the median basilic vein of the arm which had been heated to 45°C. in an arm-bath; this was done in preference to arterial puncture because the blood sample could be obtained without the slightest delay. Arterial punctures were not used in the controls as the physiology of exercise in normal people and in athletes has been extensively studied elsewhere, and the results would not affect the conclusions to be drawn about E.S. The blood, having been withdrawn in an all-glass syringe lubricated by the minimum amount of paraffin, was transferred under oil to a centrifuge tube and cooled in ice-water immediately. Samples were analysed for oxygen capacity by the method of Sendroy (Peters and Van Slyke (30)): oxygen content and carbon dioxide content (Peters and Van Slyke (30)): pH (Barker and Summerson (31)).

TABLE IX.—*Changes in the Arterial Blood Chemistry of 10 E.S. Patients Worked to Exhaustion Point on a Bicycle Ergometer. The Figures in the Time Column Represent Resting, the Time Worked before Exhaustion, and the Time Interval between the Completion of Exercise and the Removal of the Third Blood Sample (in Minutes).*

Case.	Time.	O ₂ C.P.	O ₂ Sat.	pH.	Shift.	pCO ₂ .	BHCO ₃ .	Lactate.	Increase.
1.	0.0	120.1	97	7.42	.11	40	24.2	8.0	34.8
	3.1	21.8	94	7.31		42	20.1	38.2	
	7.3	21.2	96	7.36		31	17.0	42.8	
2.	0.0	22.2	97	7.45	.07	35	22.8	8.1	28.0
	4.0	23.1	93	7.38		39	21.6	19.6	
	7.0	22.4	98	7.40		35	20.3	36	
3.	0.0	19.4	97	7.43	.04	40	24.7	14.7	22.3
	4.3	20.2	91	7.39		36	20.2	35.8	
	10.0	19.7	96	7.44		33	21.4	37.0	
4.	0.0	21.0	96	7.41	.07	39	23.2	22.6	32.6
	4.5	22.4	95	7.34		39	20.0	55.2	
	10.0	21.2	95	7.39		38	21.4	47.3	
5.	0.0	20.1	93	7.44	.10	39	21.4	11.3	20.3
	5.0	21.1	92	7.34		39	25.1	31.6	
	5.0	20.6	93	7.44		33	19.7	26.9	
6.	0.0	20.0	96	7.43	.11	38	21.2	6.4	28.4
	5.4	21.6	72	7.32		43	23.0	24.4	
	5.0	20.4	96	7.37		28	20.5	34.8	
7.	0.0	17.6	97	7.44	.08	38	15.7	9.1	43.0
	6.2	18.7	92	7.36		36	24.0	52.1	
	6.5	18.5	95	7.40		34	19.2	39.0	
8.	0.0	21.5	95	7.44	.08	40	20.2	9.1	34.3
	6.5	22.6	95	7.36		37	25.7	43.4	
	7.2	21.8	97	7.40		34	19.5	43.4	
9.	0.0	19.4	97	7.43	.11	41	20.0	17.5	71.5
	7.0	21.5	92	7.32		37	25.6	89.0	
	10.0	20.2	97	7.34		43	18.0	90.7	
10.	0.0	20.3	92	7.41	.11	39	23.6	8.3	47.1
	7.1	22.0	100	7.30		31	14.9	55.4	
	6.0	20.4	98	7.32		33	16.7	44.3	

Results.

Oxygen metabolism.—Table IX gives the figures for oxygen combining power and oxygen saturation of arterial blood before, immediately following and approximately five to ten minutes after maximal work in 10 Group 2 E.S. patients. It is immediately apparent that there is no evidence of anoxaemia in the resting blood or even post exercise. Case 6 is the only exception (oxygen

saturation immediately after exercise, 72 per cent.) ; all other bloods taken post exercise have an oxygen saturation of 91 per cent. or over.

Hyperventilation.—Table IX gives the results obtained from maximal work in the 10 E.S. patients tested. It will be seen that there is no evidence of respiratory alkalosis resulting from resting or post exercise hyperventilation.

The results show clearly that though there may be a fall of carbon dioxide pressure after exercise, this is not abnormal in amount (generally 3 or 4 mm.Hg, the most extreme being a fall from 38 to 28 mm. Hg), and is correlated with fall of bicarbonate following the production of lactic acid. In no case did the blood pH become more alkaline than the resting value.

It might be argued that we have looked for the development of alkalosis too soon. We were guided by the fact that in all the patients chosen excessive respiration had almost died away five minutes after the conclusion of exercise, and whenever we have taken another blood sample after a further five minutes this has simply shown a slow return of the pH to the resting value.

Blood lactate rise.—Table IX includes resting and post-exercise blood lactate levels, as they afford a good index of the physiological state of the patient when he reached "exhaustion point." These patients show an even lower lactate rise than the 20 E.S. patients already described (see p. 407) : a mean rise of 36.2 mgm. per cent. compared with 50.2 mgm. per cent.

Discussion on Response to Maximal Work.

In considering the response to maximal work, it is clear that the lactate rise when the 20 E.S. patients exercised to complete exhaustion on the bicycle ergometer (mean rise 50.2 mgm. per cent. $\pm$ 5.74 s.d.) was significantly different from the response of the 20 controls (mean lactate rise 78.0 mgm. per cent. $\pm$ 8.15 s.d.). There was no real difference between Group 2 and Group 3 E.S. in this respect. Kuehr, Dill and Neufeld (25) have shown that, in running, the ordinary young man will stop from exhaustion when the lactate level in the blood has reached approximately 100 mgm. per cent. (i.e. lactate rise of about 90 mgm. per cent. above the resting level). As more muscles are employed in running than in the type of ergometer we used, our lactate control figures are understandably somewhat lower than those of the Harvard Group. The results obtained suggest that E.S. patients (both Groups 2 and 3) give up exhausting physical work before they have reached a "physiological" end-point. The fact that these patients typically dread the supposed ill effects of strenuous physical exercise, because they fear the damage which may result to their hearts, etc., results in what amounts to an effort phobia.

The arterial blood gas analysis gave no evidence of anoxaemia ; at rest the oxygen saturation of arterial blood in 10 E.S. patients ranged from 97 per cent. to 92 per cent. (mean 95.6 per cent.), and after maximal work the oxygen saturation was found to be below 90 per cent. in only one case. The suggestion put forward by Haldane *et al.* (19), and later by Hick *et al.* (24), that the symptoms of effort syndrome were due to anoxaemia of effort, was contra-indicated by our findings. Nor did we find any evidence to support the hypothesis of Soley and Shock (23) that E.S. is the result of respiratory alkalosis.

After maximal work no E.S. patients showed evidence of hyperventilation alkalosis—the blood pH was never found to become more alkaline than the resting value, and the carbon dioxide pressure fell by only 3 to 4 mm. Hg, in most cases the greatest fall being 10 mm. Hg.

(c) LIGHT WORK.

Metabolic response to light work or respiratory exercise tolerance test.

Method.

A portable Benedict metabolism apparatus was used, and on the day previous to a test the patient was familiarized with the procedure. The exercise was performed on a bicycle ergometer. When tested the subject rested comfortably on the couch for half an hour, after which the mouthpiece of the spirometer was put in position, and a kymograph record of the respirations made for four to five minutes (see Fig. 5). The tap was then turned so that the subject

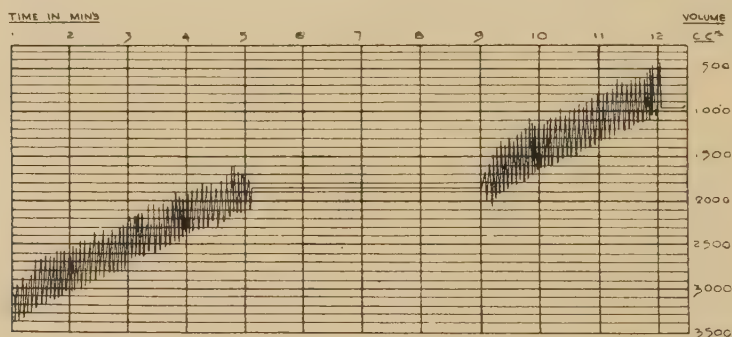


FIG. 5.—Respiratory exercise tolerance test.

was breathing from the outside air. He now placed his feet on the pedals and pedalled at 42 revolutions per minute for exactly one minute, the friction of the brake band being equivalent to a weight of 6 lb., i.e. 4,500 ft.lb. per minute. He then lay recovering his breath for a further three minutes, at the end of which time the tap was again turned on, and the respirations for the fourth, the fifth and the sixth minute after exercise recorded. The mean minute volume before and after exercise was then compared, the latter being expressed as a percentage of the former.

Results.

We have figures of 10 controls and 13 E.S. patients. The mean for the controls was 107 per cent. ± 10.4 s.d.; i.e. the ventilation in the period four to six minutes after exercise was 7 per cent. greater than the resting ventilation, while the mean for the patients was 134 per cent. ± 14.2 s.d. The difference between the two means is significant (c.r. 5.0; $P < .01$), and the ranges are such that the test probably has diagnostic value within certain limits.

(d) MINIMAL WORK OR PEDALLING UNOPPOSED.

Method.—Pedalling Unopposed.

Spirometric tests are of value only when breathing is reasonably regular, when a patient's co-operation can be obtained and when the patient is not emotionally upset by the procedure. Some patients may breathe well at rest, but when they are put in a work situation anomalies of breathing occur. In order to categorize the good and the bad breathers and in order to observe the effect of a work situation on respiration we make use of the following procedure: A subject lies on his back and breathes into the spirometer for five minutes at rest; he is then asked to place his feet on the pedals of the bicycle ergometer and pedal slowly for seven minutes. As the brake band is not in use, the subject pedals against no resistance; there is normally little increase in the total ventilation or oxygen uptake (see Fig. 6).

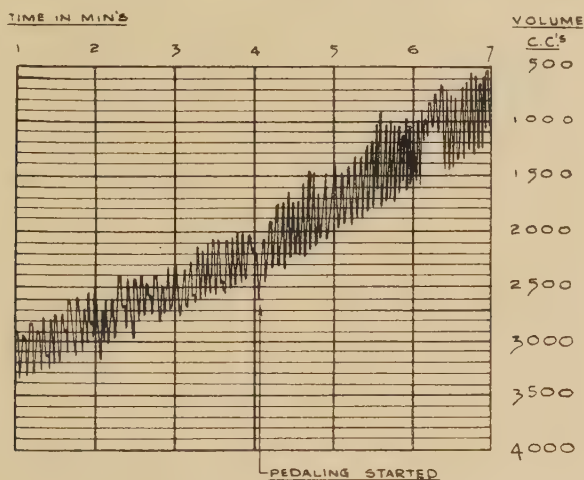


FIG. 6.—Pedalling unopposed. Normal response.

Results.

Of 75 E.S. patients tested, 36, or 48 per cent., gave a normal tracing; 25, or 33·3 per cent., showed ventilation in excess of normal, and of these, although only 1 patient gave clinical signs of tetany, practically all the remaining patients complained of giddiness, headache, breathlessness, tiredness in the legs or pounding of the heart; paraesthesias were not complained of. Six patients (8 per cent.) gave up before the end of the seven minutes saying they were exhausted. Of these, 2 had symptoms and signs indicating tetany, 1 appeared to lose consciousness, although there were no other tetanic manifestations, and of the remaining 3, 2 showed hyperventilation but no tetany, and 1 showed a progressive decrease in the volume per breath to such an extent that anoxaemia probably contributed to his breakdown. The remaining 8 patients (10·7 per cent.) gave tracings with irregular breathing, and were all mostly persons who were emotionally upset by the test. Thus, of the 75 patients tested, only 48 per cent. appeared to breathe normally in a work situation.

These results show the neurotic trends of many of the subjects tested, and the tendency for irregular and excessive breathing to occur in a work situation, although practically no work is performed by the subject (see Fig. 7).

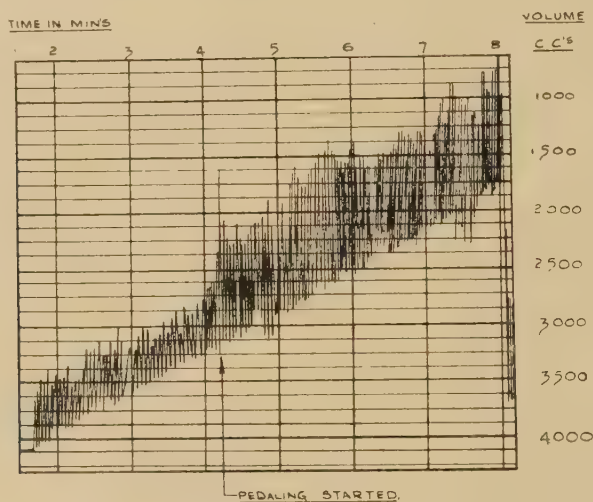


FIG. 7.—Pedalling unopposed. Hyperpnoeic response.

DISCUSSION OF THE RESULTS ON EXERCISE RESPONSE.

The standard work test differentiates significantly between groups of normal controls, and both Group 2 and Group 3 E.S. patients, and chronic anxiety states, when any of the three criteria—pulse response, oxygen uptake, or blood lactate rise—is used. The same is probably true when we compare groups of normal controls and somatic anxiety states. Hysterical patients as a group cannot be differentiated from normal controls in this way. While it is true that the above groups of neurotic patients can be differentiated from normal controls by the tests mentioned, it is doubtful if the application of these tests to the recovery period following moderate work is the best available procedure. Craig Taylor (33) has shown that the individual's fitness for hard work is best measured *during* exercise, and not during the recovery phase. On maximal work he finds that the time run is more reliable than any of the physiological measures he used (heart and respiration rates, ventilation, blood lactate, and oxygen consumption). Heart rate and blood lactate were the most reliable submaximal measures, but are approximated in maximal work by per cent. oxygen and oxygen consumption. Unfortunately, because of the feeling of suffocation and other emotional difficulties, which inevitably occur when testing neurotic subjects, we were forced to apply our tests only during the post-exercise recovery period.

The ventilation response to standard work shows clearly that comparing groups of normal controls and E.S. patients and somatic anxiety states, the patients breathe much more rapidly following exercise, although the volume

per breath is much the same in all three groups. Obviously, the patients hyperventilate compared with the controls, but the blood gas studies following maximal work show no evidence of respiratory alkalosis. The respiration of the two groups of patients appears to be less efficient than in the control group—the relatively low oxygen equivalent (ventilation required for the assimilation of 100 c.c. of oxygen) in the control group is one way of expressing this greater efficiency.

The lactate rise following maximal work was significantly different between controls and E.S. patients (both Groups 2 and 3). This difference would appear to be due to the effort syndrome's "effort phobia," i.e. his unwillingness (probably often unconscious) to overtax his strength for fear of damaging his heart, etc. Unfortunately we had to use an improvised bicycle ergometer so that the amount of work done before exhaustion could not be measured. We did not test other groups of neurotics on maximal work, so cannot say if the relatively small lactate rise following "maximal" work is an attribute of neuroses in general.

Using a respiratory exercise tolerance test (a measure of the ventilation response to light work), we found it possible to differentiate a group of normal controls from a group of E.S. patients.

Of the three responses to standard work which were tested—pulse rise, lactate rise, and oxygen uptake—oxygen uptake seemed to be the most satisfactory test for differentiating normal controls and the various neurotic groups. All groups of neurotic patients were significantly different from the controls ($P < .01$) except the somatic anxiety group, which was probably significant ($P < .02$). For the total group of 59 neurotics tested compared with the group of 20 normal controls the significance of the difference between the means for the three tests was : oxygen uptake, c.r. 7.1 ; pulse area, c.r. 5.0 ; lactate rise, c.r. 3.8.

No conclusions can be drawn as to the cause of the poor exercise response in patients complaining of symptoms of effort intolerance—clinically E.S. Groups 2 and 3. The nature of the response to maximal work indicates that there is an "effort phobia," but this does not explain the relatively inefficient pulse, lactate, and oxygen uptake response in E.S. patients compared with controls. The fear of possible ill effects of heavy work in the E.S. patients presumably produced a state of muscle tension, and, as was shown in our pedalling unopposed studies, marked anomalies of respiratory pattern were often produced by the mere work situation, even though no significant amount of work was performed. Hyperventilation often occurred on exercise, but without the production of respiratory alkalosis. This hyperventilation represented excessive work by the muscles of respiration, and might possibly contribute to the inefficient performance. A normal control with a mean oxygen uptake of 555 c.c. per minute for the five minutes post standard exercise repeated the standard work simulating the hyperventilation of the E.S. subject : he breathed at 42 respirations per minute during the exercise, and 60 per minute post exercise ; the mean oxygen uptake was now 606 c.c. per minute, while the lactate rise showed no difference (7.0 mgm. per cent.) ; post exercise ventilation had been increased from a mean of 19.4 litres per minute to 30.4

litres per minute ; breathing in this manner proved to be hard work and was difficult to maintain ; there were no symptoms or signs of hyperventilation tetany. The same subject was given intravenous atropine gr. $\frac{1}{100}$ at a time until no further pulse rise occurred ; the pulse-rate rose from 69 to 138 per minute, at which point the standard exercise was started ; for this test the mean oxygen uptake for the five minutes post exercise was 900 c.c. per minute, and the lactate rise 14.0 mgm. per cent. ; the mean post exercise ventilation was 26.5 litres per minute. Subjectively the control complained of dry mouth, postural giddiness, muscular inco-ordination on walking, fatigue, irritability, diminished pressure on micturition, feeling of eye strain and difficulty in accommodation. Finally, the same subject was given 0.7 c.c. of 1:1,000 adrenalin solution subcutaneously : after ten minutes a tense feeling in the epigastrium, mild palpitation, and a feeling of constriction in the chest were remarked, and there was pallor of the face—the pulse had risen from 64 to 81, and at this point the standard exercise was started. Unlike the atropine test, no difficulty was experienced during the pedalling, and no subjective discomfort was described post exercise. The mean oxygen uptake for the five minutes post exercise was 538 c.c. per minute. These results suggest the possibility of changes in exercise efficiency in relation to functional changes in the involuntary nervous system ; however, consideration of the clinical material used does not clarify the situation very much. Symptoms and signs due to vegetative dysfunction were present in E.S. Group 2, E.S. Group 3, and somatic anxiety states, and were absent in the chronic anxiety states and hysterics. If clinical evidence of disturbance of vegetative function were the determining factor in exercise efficiency, then both the chronic anxiety and hysterical groups would perform as efficiently as the normal control group. This did not prove to be the case, and the chronic anxiety group was significantly different from the control group on all three tests on standard work—pulse, lactate, and oxygen uptake—while the hysterical group was significantly different from the control group in oxygen uptake.

We sought other physiological leads which might throw some light on the mechanism if not the aetiology of poor exercise response. The forearm blood flow was measured with a Lewis and Grant plethysmograph. We measured the arm blood flow at rest and then following work on the bicycle ergometer ; to our surprise no increase in the arm volume occurred until very heavy work was done—apparently the increased blood flow caused by the work was all directed to the leg muscles which were doing the work ; certainly it did not reach the arms until the subject was near exhaustion. This “homeostasis” was less marked in the E.S. patients than in the controls ; in fact some controls even when worked to complete exhaustion showed no rise in the arm blood flow. We gave up this promising line of inquiry because we had no facilities to control environmental circumstances (temperature, humidity, etc.) and test re-test reliability proved unsatisfactory.

Studies of cardiac output following work by the direct Fick method (McMichael and Sharpey-Schafer (34)) were contemplated, but permission to catheterize the right auricle in service patients was refused.

By applying a tourniquet to the upper arm and eliminating the general

circulation we hoped to study the local muscle chemistry, particularly the lactate rise following a known amount of work to the forearm muscles, but removing constant amounts of venous blood proved difficult, and again we could not obtain a high day-to-day reliability.

In brief our efforts to measure poor exercise response in E.S. met with some degree of success, but no real understanding of the mechanism of this poor exercise response was achieved.

Having studied the neurotics' response to exercise stress we decided to apply other stresses, and see if again differences between groups of normal controls and neurotics could be demonstrated.

2. RESPONSE TO PAIN.

For this test we measured the ventilation and blood-pressure response to a painful stimulus applied for approximately 2 minutes. The choice of a suitable painful stimulus presented difficulties, as we wished to use a relatively long test period. We finally decided to ask the patient to squeeze a rubber bulb until empty of air at a rate of 80 squeezes per minute (timed by a metronome). Immediately before starting this work a sphygmomanometer cuff was applied to the upper arm, and the circulation to the limb cut off by applying a pressure of 200 mm. Hg. The ischaemia was maintained for 2 minutes in all—one minute while pumping and one minute afterwards. During this time a dull ache of increasing intensity was experienced by the subject.

Material.

Twenty normal controls (a random sample of young soldiers), 10 cases of E.S., 10 cases of somatic anxiety not complaining of effort intolerance, and 8 cases of conversion hysteria were used for these tests.

(a) *Ventilation.*—The subject lay comfortably on a couch, and was habituated to the use of the portable Benedict metabolism apparatus. On the day of the test he was not fasted, but rested for 30 minutes on the couch before the test was started. When three minutes' regular breathing had been recorded on the spirogram the arm circulation was cut off, and simultaneously the subject started squeezing the bulb. The subject continued to breathe through the closed circuit, and respirations were recorded for three minutes following the cessation of pumping, i.e. one minute with the arm circulation still cut off, and two minutes with the circulation restored (see Fig. 8). The spirogram was then examined, and the average ventilation per minute for the three minutes at rest calculated. The ventilation during the minute when the subject was pumping was ignored, but the ventilation for the next minute, i.e. when the pain stimulus was at its maximum, was measured (see Fig. 8). This result was now expressed as a percentage rise or fall compared with the resting figure. The test was repeated on two successive days, and the final figure represented the mean of these two tests.

Results.—Table X shows the ventilation response to pain in the four groups studied. In 20 normal controls the ventilation showed a mean increase per cent. of 10.4 ± 16.5 s.d. (range -11 to $+72$). Four subjects showed a

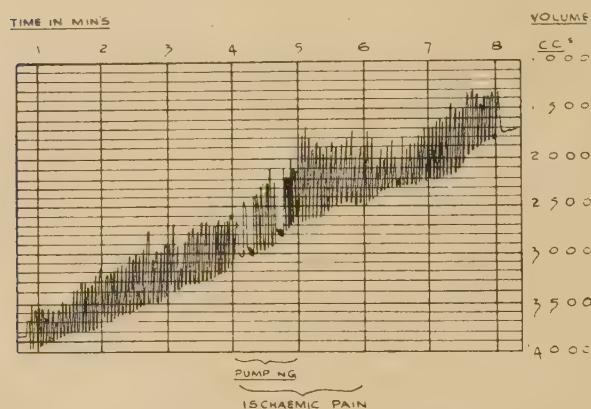


FIG. 8.—Ventilation response to a painful stimulus.

TABLE X.—*Ventilation Response to a Painful Stimulus. Units Represent Percentage Rise or Fall of Ventilation Compared with the Resting Ventilation. (Mean of Two Tests carried out on Successive Days.)*

	Range of ventilation.	Mean incr. % ventilation.	S.D.	C.R.	P.
20 normal controls	-11 to +72	10.4	16.5	—	—
10 E.S. patients	-3 to +90	36.2	32.0	2.5	<.02
10 anxiety states	-13 to +148	43.0	51.9	1.95	<.04
10 E.S. and 10 anxiety states	-13 to +148	39.6	43.4	2.9	<.01
8 hysterics	+5 to +140	57.1	42.7	3.0	<.01

decreased ventilation as a result of the pain stimulus. The 10 E.S. patients gave a mean percentage ventilation increase of 36.2 ± 32.0 s.d. (range -3 to +90) . . . (c.r. 2.5; $P < .02$). The 10 anxiety states gave a mean percentage ventilation increase of 43.0 ± 51.9 s.d. (range -13 to +148) . . . (c.r. 1.95; $P < .04$). Taking the anxiety states and the E.S. patients together as a group of 20 patients the mean percentage ventilation increase is 39.6 ± 43.4 s.d. (c.r. 2.9; $P < .01$). The group of 8 hysterics also differs significantly from the control group; mean percentage ventilation increase 57.1 ± 42.7 s.d. (c.r. 3.0; $P < .01$).

(b) *Blood-pressure responses.*—The same groups of patients and controls were used as in the last test, except that 2 hysterics were added, bringing the total of this group up to 10. The subject was rested lying down for 20–30 minutes with a sphygmomanometer cuff on both upper arms. When the B.P. was constant the circulation of the arm was cut off, and the subject squeezed a bulb for one minute in the manner already described. During the second minute when the ischaemic pain was increasing two B.P. readings were taken, and then minute readings for the next five minutes. The first two readings were invariably higher than the succeeding readings, and the higher of these two (systolic and diastolic) was used for comparison with the resting B.P. As before, each test was repeated on two successive days and the mean of the results calculated.

Results.—All but 2 (both controls) of the 48 subjects tested showed a rise of systolic B.P. during the ischaemic pain. No significant differences were

found between the various groups. Controls mean rise of systolic and diastolic B.P. 14, 16 mm. Hg (range of systolic B.P. - 3 to + 34 mm. Hg). Parallel figures for the other groups were 10 E.S. patients 11/11 mm. Hg (range 3 to 25 mm. Hg), 10 anxiety states 10/10 mm. Hg (range 2 to 21 mm. Hg) 8 hysterics 13/18 mm. Hg (range 3 to 24 mm. Hg).

3. RESPONSE TO COLD.

The procedure in these tests was similar to that used for the ischaemic pain test except that a cold stimulus was substituted for the painful stimulus. The same 48 subjects were used as in the previous test. The technique for B.P. response was identical with the cold pressor test described by Hines (32).

(a) *Ventilation*.—The patient breathed into the closed circuit of a Benedict metabolism apparatus as before. After a satisfactory resting ventilation had been recorded for three minutes, the forearm and hand was immersed in a bath of water at 3°C., and held there for one minute. Respirations were recorded during this minute, and for three further minutes after the arm had been withdrawn from the water (see Fig. 9). The average ventilation per minute

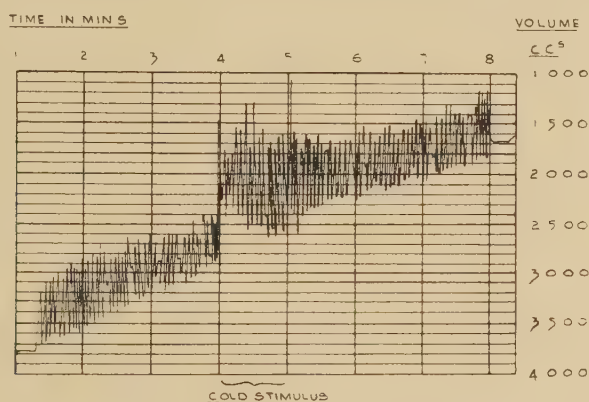


FIG. 9.—Ventilation response to a cold stimulus.

for the three minutes at rest was compared with the ventilation for the minute during the cold stimulus, and the rise or fall expressed as a percentage of the resting ventilation. As before, each test was repeated on two successive days, and the mean percentage rise or fall taken.

TABLE XI.—*Ventilation Response to Cold Units Represent Percentage Rise or Fall of Ventilation Compared with the Resting Ventilation. (Mean of Two Tests carried out on Successive Days.)*

	Range of ventilation.	Mean incr. % ventilation.	S.D.	C.R.	P.
20 normal controls	- 8 to +27	8.1	9.5	—	—
10 E.S. patients	- 6 to +91	32.3	25.2	2.9	< .01
10 anxiety states	-13 to +72	31.1	23.7	2.9	< .01
10 E.S. and 10 anxiety	-13 to +91	31.5	25.8	3.7	< .01
8 hysterics	- 6 to +77	27.0	22.1	2.4	< .03

Results.—Table XI shows the ventilation response to cold in four groups studied. The 20 normal controls showed a mean increase percentage of 8.1 ± 9.5 s.d. (range -8 to $+27$). Three subjects gave negative results. The 10 E.S. patients gave a mean percentage ventilation increase of 32.3 ± 25.2 s.d. (range -6 to $+91$) . . . (c.r. 2.9 ; $P < .01$). The 10 anxiety states gave a mean percentage ventilation increase of 31.1 ± 23.7 s.d. (range -13 to $+72$) . . . (c.r. 2.9 ; $P < .01$). The group of 20 E.S. and anxiety states gave a mean percentage ventilation increase of 31.3 ± 25.8 s.d. . . . (c.r. 3.73 ; $P < 0.01$). The eight hysterics showed a mean percentage ventilation increase of 27.0 ± 22.1 s.d. (range -6 to $+77$) . . . (c.r. 2.4 ; $P < .03$).

(b) *Blood pressure response.*—The same subjects were used as in the previous tests. When the resting B.P. had become constant the hand and forearm were immersed in a bath of water at 3°C . for one minute. Two B.P. readings were taken during this minute, and then one reading per minute for the next five minutes. The highest reading was compared with the resting B.P. The test was repeated on two consecutive days and the mean rise or fall of systolic and diastolic B.P. recorded.

Results.—One hysteric and one anxiety state showed no rise of systolic B.P., otherwise all 48 subjects showed a rise. No significant differences were shown between the various groups. The controls showed a mean rise of systolic and diastolic B.P. of $7/11$ mm. Hg (range of systolic B.P. 0 to $+18$ mm. Hg). Parallel figures for the other groups were 10 E.S. patients $11/11$ mm. Hg (range -4 to $+23$ mm. Hg), 10 anxiety states $7/9$ mm. Hg (range 0 to 10 mm. Hg), 8 hysterics $8/11$ mm. Hg (range 0 to $+15$ mm. Hg).

DISCUSSION ON RESPONSE TO PAIN AND COLD.

The response to pain and cold stimuli may be discussed together, because the same subjects were used for both tests and the results are very similar in the two tests.

Comparison between the normal controls and neurotic subjects shows that the two groups are clearly differentiated by the respiratory response to pain and cold, but cannot be differentiated by the B.P. response to these two stimuli.

The ventilation response to cold (Table XI) differentiates the controls and neurotics rather better than does the response to pain (Table X). The ventilation response to cold is significantly different ($P < .01$) between the controls and the E.S. and anxiety groups, and probably significant ($P < .03$) with the hysterics.

The ventilation response to pain is significantly different ($P < .01$) between the controls and hysterical groups, and probably significant with the E.S. ($P < .02$) and anxiety groups ($P < .04$).

Taking the total 28 neurotic subjects and comparing them as a group with the 20 controls, the ventilation response to both pain and cold is significantly different between the two groups.

Test re-test reliability.—The total 48 subjects used in the ventilation response to both pain and cold were given each test on two separate occasions; only

a fair degree of reliability is shown by the two tests by applying the method of product moment correlation ; for the pain response $\gamma = 0.625$, and for the cold response $\gamma = 0.506$.

The B.P. response to both pain and cold failed to show any significant difference between the control and neurotic groups. Studying the cold response, Hines (32) in his cold pressor test considers a systolic rise of 14 mm. Hg. and a diastolic rise of 10 mm. Hg. as indicating incipient hypertension ; 4 controls showed a systolic rise of more than 14 mm. Hg. on one test only ; 3 E.S. patients showed such a rise on both tests, and 1 E.S. patient on one test only ; 3 anxiety states showed such a rise on one test only ; 1 hysteric showed the response on both tests, and 2 on only one test. Hines found a positive response in 15 per cent. of his controls ; if one positive test is accepted (and it is not demanded that the test be positive on both testings), then we found the test positive in controls 20 per cent., E.S. 40 per cent., anxiety states 30 per cent., and hysterics 30 per cent.

4. RESPONSE TO EXCITEMENT.

It is difficult to devise an anxiety-producing situation which represents a suitable standard stimulus. We considered using the air raids on London, but although these certainly produced fear responses, there was no hope of standardizing the test situation. We finally decided to take the patient within a few minutes of his admission to the ward, and in the strange company and environment of the doctor's office. The patient was simply asked to remove his jacket and lie down ; his pulse and respirations were recorded and B.P. was then measured. Two to three weeks later the patient was kept in bed fasting, and the above measurements repeated.

Material.—Unfortunately it was impracticable to use the above procedure on normal controls, as their relationship to the doctor would have been different compared with the patients, and they were not living in hospital, and therefore not becoming familiarized with the hospital surroundings. Despite the lack of normal controls for comparison with the patients it was felt that the test should be carried out on patients ; 10 E.S. patients, 10 anxiety states, and 10 patients with conversion hysteria were studied.

TABLE XII.—Mean Pulse Respiration and Blood-pressure Readings for Three Groups of Patients at First Interview (when Excited), and 2-3 weeks later under Basal Conditions. (Pulse and Respirations per Minute.)

	First interview.			Basal.			Difference.		
	P.	R.	BP.	P.	R.	BP.	P.	R.	BP.
10 E.S. patients	84	22	$\frac{144}{85}$	70	19	$\frac{114}{72}$	14	3	$\frac{30}{13}$
10 anxiety states	81	23	$\frac{138}{79}$	65	20	$\frac{113}{74}$	16	3	$\frac{25}{5}$
10 hysterics	72	19	$\frac{132}{82}$	69	19	$\frac{115}{75}$	3	0	$\frac{17}{7}$

Results.—Table XII shows the mean figures of pulse, respirations and B.P. at the first interview (when excited), and some weeks later (when relaxed),

for the three groups of patients tested. All three groups show a drop in the readings under basal conditions compared with the first interview—this drop is less marked in the hysterical group than in the other two groups, but there is no significant difference between the groups.

Taking the 10 E.S. and 10 anxiety states together the mean figures are as follows :

	Pulse.	S.D.	Resp.	S.D.	Syst. B.P.	S.D.
First interview	82	15.8	22	4.7	141	10.3
Basal	67	10.3	19	4.6	114	14.6

If one compared the mean systolic B.P. at first interview (141), with the mean basal systolic B.P. (114) in this group, the difference is significant (c.r. 6.8 ; $P < .01$). The drop in mean pulse between the two interviews is also significant (c.r. 3.6 ; $P < .01$). The fall in respirations is probably significant (c.r. 2.0 ; $P < .03$).

Under basal conditions the systolic B.P. was below 100 mm. Hg. in 1 E.S. patient, in 3 anxiety states, and in 1 hysteric.

Discussion on Response to Excitement.

The results obtained show how misleading pulse, B.P., and respiration measurements may be in neurotics unless allowance be made for the emotional factor. Unfortunately, as no normal controls were available, it cannot be said that the results furnish further evidence of the relative vegetative over-responsiveness in neurotics indicated by the results of previous tests.

5. RESPONSE TO PERSISTENCE TESTS.

Two tests were adopted to test the subject's persistence in a setting of physical discomfort—(a) breath holding and (b) leg raising.

For the breath-holding test the patient was asked to stand, and at the top of a normal inspiration asked to hold his breath for as long as possible ; this was timed by stop-watch.

For the leg-raising test the patient lay on his back in bed and raised his left leg to half a right angle ; he was asked to maintain his leg in this position for as long as possible.

Material.—Twenty normal controls including nine young doctors were used. Fifty patients were used, made up of 35 E.S. patients and 15 anxiety states.

TABLE XIII.—*Significance of the Difference between the Means (C.R.) of 20 Normal Controls and 50 Patients (35 E.S. and 15 Anxiety States), on Breath-holding and Leg-raising Tests.*

	Breath holding			Leg raising.		
	Mean (secs.).	S.D.	C.R.	Mean (secs.).	S.D.	C.R.
20 normal controls	57.0	21.2	—	312	147	—
50 patients (35 E.S. and 15 anxiety)	34.9	15.4	4.2	135	61	5.2

Results.—Table XIII shows the results of the breath-holding and leg-raising tests. For the breath-holding tests the mean of 20 controls was 57.0 seconds $\pm$ 21.2 S.D., and for the 50 patients 34.9 seconds $\pm$ 15.4 S.D. The difference between the two groups is significant—c.r. 4.2 ; $P < .01$.

On the leg-raising test 20 controls gave a mean of 312 seconds (5' 12") $\pm$ 147 S.D., and 50 patients a mean of 135 seconds (2' 15") $\pm$ 61 S.D. The difference between the two groups is significant—c.r. 5.2 ; $P < .01$.

Discussion of Results of Persistence Tests.

The results of both tests indicate that the neurotic patients as a group lack persistence in the type of situation used for the test. The tests may well measure the same psychological factor as the maximal work, when the subject was asked to work on an ergometer to complete exhaustion. The tests here described are of course much simpler to carry out, and might prove to be a useful and rapidly carried out clinical test. Work still remains to be done, however, to determine what information the tests really provide.

6. OTHER FINDINGS.

Previous work on the blood enzyme choline esterase which hydrolyses acetyl choline formed at the synapses of neurones (Tod and Jones (35)) suggested that a relatively high level of choline esterase was found in the blood of neurotic patients with autonomic over-activity. This work was later confirmed by Richter and Lee (39). We found that 112 E.S. patients gave a mean blood choline esterase of 98 units ; this is significantly different to a group of 60 normal controls who showed a mean choline esterase of 79 units ($P < 0.01$).

Insulin tolerance tests (Fraser *et al.* (36)) were done on 21 E.S. patients : 19 curves were essentially normal ; in the remaining two cases the blood sugars were significantly below the fasting level after two hours ; neither of these cases gave histories suggestive of spontaneous hypoglycaemic attacks, and there was no clinical evidence of pan-hypopituitarism. Facilities were not available for doing colorimetric assays of 17-ketosteroids in the urine.

Fatigue is prominent among the symptoms of dietary deficiency, particularly in relation to deficiencies of vitamin B₁ and C. Jolliffe *et al.* (37) described a clinical picture indistinguishable from E.S. occurring in volunteers deprived of vitamin B₁. We studied (38) vitamin B₁ (excretion and saturation test) and vitamin C (excretion and blood level) in 11 E.S. Group 2 and 10 E.S. Group 3. Vitamin C appeared to be low, but no lower than we found in normal subjects at that time of the year (winter). There was no evidence of vitamin B₁ deficiency in our patients.

APPLICATION OF OBJECTIVE FINDINGS TO THE TREATMENT OF EFFORT SYNDROME.

Treatment of most psychiatric conditions presents great difficulties because all too often the cause is not clear. At the beginning of the century the advent of the psychoanalytic method raised hopes that aetiological forms of treat-

ment would be applicable to most psychiatric problems ; these high hopes were not fulfilled, and there is no common agreement that psychoanalysis is the method of choice in more than a relatively small group of neurotic cases, and in few, if any, psychotic cases. Further, the impracticability of a method which limits one therapist to treating 100 patients in a lifetime cannot be overlooked. More recently physical methods of treatment—insulin coma, E.C.T., and leucotomy in particular—have given good therapeutic results in psychotic patients ; here, however, one is dealing with purely empirical procedures, and although much research has been stimulated, no important findings have yet resulted either as to the nature of the illnesses treated (mainly schizophrenia and depression), or the mode of action of the treatment. At present it is possible to hear one authority advocating psychoanalytic treatment (lasting 2 or 3 years) for a case of depression, and another authority advocating E.C.T. (lasting 2 to 3 weeks) for the same case. Obviously the therapist is placed in a very difficult position when deciding on a course of treatment, but whatever his training and temperament may dictate, there can be no question that the more relevant facts collected about a case, the better balanced will be the course of treatment planned.

We started treating our E.S. patients and anxiety states at the beginning of the war with no fixed attitude towards procedure. We were a mixed group of physicians, psychiatrists, and research workers, and felt that many questions had to be studied, and if possible answered, before we were able to adopt any general orientation in treatment. Naturally we set about collecting clinical data from our psychiatric and physical examinations. The latter aspect of the problem has been very adequately covered by Paul Wood in his Goulstonian Lectures (1). The questions posed at the beginning of this thesis indicate the extent of our objective studies ; the content of the thesis supplies the answers to these questions. How did all this help us in deciding on treatment procedures ? In severe cases of E.S. there was ample evidence from the symptoms and clinical signs that the subject was ill ; milder cases, however, were often difficult to distinguish from the hystero-malingeringer ; further, we did not know if despite the symptoms we would be able to demonstrate by objective means a poor exercise response. Our studies showed us that these men as a group had a poor exercise response, but the complete understanding of the nature of this disability eluded us. Nevertheless, the nature of the symptoms and signs (palpitation, hyperpnoea, postural giddiness and fainting, left chest pain, tension headaches, cold blue hands, emotional sweating, etc.) all suggested that whatever the basic aetiological factor or factors in the condition were, vegetative imbalance was one accompaniment of the disturbance. Our studies of respiratory response to pain and cold gave further objective evidence of this autonomic lability. Our inquiries had shown us that the E.S. patient *had* a disability, i.e. a poor exercise response ; further, the response to maximal work showed that there was an effort phobia—that the E.S. patient failed to drive himself to physiological end-point, presumably for fear of the possible ill effects (to his heart) of excessively hard work. The patients themselves invariably attributed their condition to some physical disease—almost always heart disease. Repeated physical examina-

tions, X-rays, and reassurance by cardiologists, etc., had failed; they were told they had no heart disease, but how did that simple reassurance help them to deal with their palpitations, left chest pain, fainting, etc., which after all were not imaginary? We soon realized that we had to educate these men so that they could come to realize the true meaning of their symptoms; only thus could they reasonably be expected to give up the idea of heart disease which the symptoms so strongly suggested. The lay public has a very limited catalogue of medical illnesses, accumulated largely by hearsay and visiting relatives and friends in hospital; one of the few conditions which is commonly known and feared is "heart disease," and it would be strange, indeed, if a layman assailed by palpitation and precordial pain failed to diagnose himself immediately—in an age when most physicians are ignorant of psychosomatic medicine we cannot ask too much of the layman. But we soon found that to teach the physiological factors contributing to palpitation, breathlessness, left chest pain, tension headaches, postural giddiness and fainting, emotional fatigue, etc., to individual patients made impossible demands on our time. So in 1941 we started taking the whole ward of up to 100 patients with E.S. as one group. Details of the method evolved would be too long to elaborate here (Jones (12, 43)). In brief, three hours of instruction were given each week—a course covering 12 hours of instruction. In this way the course lasted one month, and as the average length of stay in hospital per patient was six to eight weeks, there were always some patients in the group who had had a complete "course." This was valuable, as our method was to let the patients themselves work out the mechanism of their symptoms, e.g. the doctor would suggest that they should try to work out the mechanism of postural giddiness, and simply guide the ensuing discussion. We found this to be much the best educational procedure for our particular needs, and it was astonishing how articulate even a dull intellect could become. Most of the men had had mechanical training in the army, and enjoyed wrestling with the intricacies of human physiology. And the subject *was* interesting to practically everyone; our own studies of exercise physiology were referred to frequently, and correlated with the exercise response of athletes as well as their own poor performances. Moreover, most of the men had actually performed the tests and even helped in the laboratory in some capacity, e.g. some excellent equipment was made for us by the patients. We drew freely from such fascinating studies as *Human Gastric Function*, (Wolff and Wolff (40)), *The Wisdom of the Body* (W. B. Cannon (41)), and *Progressive Relaxation* (E. Jacobson (42)), as well as papers in the literature on fainting, etc. The subjects of the talks are the following:

1. The understanding of the voluntary nervous system, and its functions in maintaining external harmony, e.g. you find a room too noisy, so you get out.
2. The understanding of the internal milieu, and the function of the involuntary nervous system in maintaining harmony.
3. The two parts of the involuntary nervous system, and possible combinations, i.e. the sympathetic acting as a whole and the para-sympathetic acting in part.
4. Application of the previous two talks on external and internal harmony, e.g. it is a hot day so what happens (a) in the thinking part of your brain? and (b) in the automatic part?

5. The understanding of fear, (a) its physical and somatic aspects ; (b) its teleological value ; (c) its "ordinariness."
6. Nerves. Nervous tension. Muscle tension.
7. Relaxation. Anxious face. Awkward attitude. Restlessness in bed. Action potentials and thinking.
8. Left chest pain and breathlessness.
9. Circulation, cold blue hands, giddiness, fainting, blanching, blushing, etc. Homeostasis and the efficient distribution of blood.
10. Nervous dyspepsia.
11. Fatigue, nervous and muscular ; fatigue of activity and of inactivity.
12. Depression and insomnia.

The main advantages derived from these talks would appear to be :

1. The patient is given an idea of anatomy and physiology, sufficient to allow him to objectify his symptoms.
2. The discussion of symptoms (which he may or may not have) in an impersonal manner also tends to produce an objective attitude towards his symptoms.
3. The conversation being on the patient's favourite topic, i.e. health, is of great interest to him.
4. The situation is an informal one, and the patients may be less tense than when being interviewed individually, and may therefore be presumed to be more receptive.
5. The group acceptance of a point has a strong suggestive value.
6. The patient's self-respect is considered ; to give up his organ neurosis would entail a loss of prestige in his own eyes, and in those of the outside world. This is countered if he can give a reasonable explanation of the meaning of nervousness, and has a realization of the enormous importance of this factor in medicine.
7. If he genuinely wants help he will be relieved to learn that no serious consequences need result from his symptoms.
8. The opportunity for raising health problems three times a week in open discussion leads to less health talk amongst the patients themselves, and, more important, leads to a more critical and informed attitude by his audience in the ward.
9. After a time the patients come to appreciate the "ordinariness" of their symptoms.
10. There is an enormous economy in doctors' time.

Our aim in these talks was not the elimination of symptoms, but a change of attitude towards the symptoms—that they should no longer be attributed to heart disease, etc., but understood as resulting from the autonomic accompaniments of emotional conflicts. Many of the patients (E.S. Group 2) had had a previous disability (poor exercise response) which they had simply accepted as a limitation, but under the stresses of the army in war-time this disability became an illness, the subject now showing a neurotic attitude towards his symptoms. Our aim was not to eliminate these symptoms, but to alter the man's attitude, and get him back to his previous rational acceptance of a slight disability. To achieve this it was usually necessary either to transfer him to lighter duties, not entailing violent physical exertion, or discharge him from the army. The percentage of E.S. patients returned to the army was as follows : 1941, 49 per cent. ; 1942, 63 per cent. ; 1943, 59 per cent. ; 1944, 66 per cent. Unfortunately no adequate follow-up of this material is available, but the results must have been reasonably good, since a large percentage of failures would inevitably have been returned to Mill Hill as the main E.S. unit in the country.

In conclusion, no attempt has been made to go into the treatment of E.S. in any detail. Our findings showed that E.S. is not a psychiatric diagnosis,

and the usual psychiatric diagnosis should be used, with effort syndrome added in brackets. To discuss fully the treatment of E.S. would be to enter the troubled waters of psychiatric treatment in general. Our aim has been to collect objective information regarding a syndrome, the nature of which was controversial, and apply this knowledge to the formulation of a treatment programme. It might be argued that a similar approach to the selection of cases suitable for the various forms of physical treatment in psychiatry is desirable. By objective study of the vegetative and other physical characteristics of case material, certain significant factors might emerge which might correlate with some clinical finding, e.g. the measurement of some attribute of "tension" might aid the selection of a suitable case for leucotomy; at present of two clinically similar depressions, one may respond favourably to the operation, and the other fail. Physical treatment methods certainly interfere with the body function, and they may well produce their effects by this change. We need such objective guides, since our clinical sense is wrong all too often; further, any such objective findings might throw some light on aetiology, and improve our treatment methods.

SUMMARY.

1. EXERCISE RESPONSE to work done on a bicycle ergometer.

(a) *Standard work*: (6,750 ft.lb. of work per minute for five minutes).

A significant difference between a group of normal controls and groups of neurotic patients with various diagnoses was obtained by measuring the post exercise pulse response (pulse area), the post exercise oxygen uptake, and the blood lactate rise following exercise.

Post-exercise ventilation showed no evidence of deficient ventilation; the volume per breath was approximately equal in controls, effort syndrome (E.S.), and anxiety states, but in both groups of patients more ventilation was necessary for the assimilation of 100 c.c. of oxygen than in the controls.

(b) *Maximal work*: (work to complete exhaustion).

Twenty normal controls showed a significantly greater blood lactate rise following maximal work than did a group of 20 E.S. patients. It appeared that the E.S. patients gave up before a "physiological end-point" had been reached, or in other words, that the E.S. patients had an effort phobia.

Arterial blood gas analysis gave no evidence of anoxaemia after maximal work; nor was there any evidence of respiratory alkalosis resulting from hyperventilation after maximal work, judged by the blood pH and $p\text{CO}_2$.

(c) *Light work*: (4,500 ft.lb. of work per minute for one minute).

A simple respiratory exercise tolerance test was devised using a closed circuit metabolism machine. Significantly greater ventilation post exercise was recorded in the group of E.S. patients compared with the controls.

(d) *Minimal work*: (pedalling against no resistance).

A work situation without any real work being done was created by asking the subject to pedal the ergometer against no resistance. Respiratory tracings were obtained by using a closed circuit metabolism apparatus. The results

showed a marked tendency in E.S. patients for irregular and/or excessive breathing to occur in a work situation.

The reason for the poor exercise response in neurotic patients was studied, but no definite conclusions were arrived at. An attempt to create experimentally a poor exercise response in a normal control showed that paralysing the vagus by intravenous atropine resulted in a greatly increased post exercise oxygen uptake; a much smaller rise resulted from voluntary hyperpnoea (simulating E.S. breathing), or the administration of adrenaline to the control before exercise. Neither muscle tension nor autonomic over-activity alone appeared adequately to explain the poor exercise response in neurotic patients.

2 and 3. RESPONSE TO PAIN AND COLD.

Blood pressure and respiratory responses to these two external stimuli were studied. Significant differences between certain groups of neurotics and normal controls were obtained when the increased ventilation resulting from the stimulus was measured. The B.P. response to the two stimuli showed no significant difference between controls and neurotic patients.

4. RESPONSE TO EXCITEMENT.

The emotional excitement of the initial interview was used as a stimulus, and pulse, respiratory, and B.P. readings taken at this time were contrasted with similar readings taken some weeks later under basal conditions. A possibly significant fall in pulse and B.P. readings occurred in certain groups of neurotic patients, but unfortunately no normal controls were available for comparison.

5. PERSISTENCE.

Breath-holding and leg-raising tests were used, and both tests showed significant differences between groups of neurotic patients and normal controls.

6. OTHER FINDINGS.

The enzyme choline esterase was found to be significantly higher in a group of E.S. patients when compared with a group of normal controls. It is suggested that blood choline esterase is higher in subjects with autonomic over-activity.

Insulin tolerance tests done on E.S. patients gave generally normal results.

We found no evidence of vitamin B₁ deficiency in E.S. patients on quantitative testing (excretion and saturation test). Vitamin C (excretion and blood level) appeared to be low, but no lower than we found in normal subjects at the same time of year (winter).

7. TREATMENT.

The above objective findings were used to guide our formulation of a treatment programme designed to combat effort intolerance in E.S. patients. Education of the patient to an understanding of the meaning of his symptoms is considered to be the most important aim. Twelve hours of physiological

and psychological talks were given each month to the whole group of E.S. patients. Cures were not expected, but rather a change of attitude by the patient towards his symptoms—these which previously had been regarded as an illness were now accepted without anxiety as an understandable physical disability. The wider question of the psychiatric treatment of the neurosis itself is not discussed, as our concern is primarily with poor exercise response, and the symptoms related to this.

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PERSONALITY CHANGE AND PROGNOSIS AFTER LEUCOTOMY.

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THOUGH twelve years have now passed since the first prefrontal leucotomy was performed, the status of this form of therapy is still far from settled. There are some who would never perform the operation at all ; and some who would reserve it for the chronic sick ; while others (Fleming, 1944) would advise its use at an early stage in the illness in cases where there were reasonable grounds for believing that recovery would not otherwise occur. With opposition of a purely emotional kind, the profession as a whole need hardly concern itself ; for appeals that the integrity of the nervous system be maintained at all costs are unlikely to impress those whose daily work brings them into contact with the personality degradation of chronic mental illness. It is difficult to see why interference with the brain in order to save sight or to save life in the case of tumour should be regarded as either more or less wicked than interference designed to save human reason.

Much more important, however, is the essentially reasonable demand that the indications for, and effects from, the operation should be known with as much precision as obtains in other types of surgery. And it is still unfortunately true that there are few contributions to the literature which have produced any solution to these problems. If it were known, for example, that 50 per cent. of schizophrenics could be improved substantially by the operation, this would not be much assistance in assessing the prognosis of an individual case, for one could not say more than that there were equal chances of recovery and failure. In fact the statement would be untrue, for the figure of 50 per cent. would apply only to the average of a widely heterogeneous group, and the case considered might well be of a type with either an extremely good or an extremely bad prognosis. The same considerations apply with equal force to depression. It is now clear that tension is not the prognostic guide that it was thought to be, for it is well known that many tense depressives are not cured by leucotomy, while a few placid schizophrenics are. The position with regard to personality change is better and there is now an increasing number of careful assessments available. Nevertheless it is still uncertain to what degree a frontal lobe syndrome, if such a syndrome exists, is a gainful exchange for a psychosis.

The present paper arose out of a study of 59 consecutive cases on which the operation had been performed in this hospital, and some of which had been discharged subsequently. It appeared probable that improvement continues for much longer than was originally thought to be the case, and the study was therefore confined to those whose operation had been performed not less than

three years previously. Only two cases out of the original series of sixty-one proved to be untraceable. Every case, whether discharged or not, was examined fully by the author ; and in the case of those discharged a trained social worker visited the home and interviewed the family. In some cases, with the patient's permission, the employer was interviewed as well. Every effort was made to approach the problem of personality change with an open mind ; and the following directive to the social workers indicates the scope of the investigation in its original informal language, being supplemented by personal discussion.

" INVESTIGATION OF LEUCOTOMY CASES.

"The purpose of the investigation includes much more than an inquiry into the effect on the patient's illness. It is desired to know what leucotomy has done to him as a social unit. This to a large extent depends not on what he says himself, but upon what other people think of him, and we want every possible source of information to be tapped.

"Informants should be told that there is no ulterior motive behind the inquiry and that the patient will not be interfered with, but that we are merely obtaining information of the results of leucotomy to help other patients.

"Informants should be encouraged, after an explanation, to give an account themselves, without prompting, of what they think of the patient, for such an integrated account will be far more valuable than a list of answers to specified questions.

"However, special inquiry is desirable into the following :

"(1) *Work*.—What different jobs he has held, and between what dates ; why the job was changed ; the patient's reaction to his work, and his employer's reaction to him ; any slackness, lateness, under- or over-conscientiousness.

"(2) *Marriage*.—Any difference in sexual habits—any difference in frequency, the appearance of perversion, etc. ; any change in his affection for his family, and concern about their welfare. Any irritability, outbursts of temper, depression, sleeplessness, etc.

"(3) *Personal habits*.—Any changes in his hobbies ; whether he reads more or less than he used to ; what sort of things he reads.

"*Conclusion*.—I do not know what the investigation will reveal, which is why it will be so interesting to do. It may be that these patients are apathetic and lacking in ambition, and rather more vegetable-like than they were before. It may be that they are irritable, ill-tempered creatures, cruel and indifferent to their families, or, on the other hand, they may be placid, good-tempered helpmates. Please, therefore, do not be bound by the above, and follow up any line which appears to be revealing some personality change in the patient.

"In essence, what we want to know is what leucotomy does to the man's soul."

It is abundantly clear that personality change due to the operation alone can only be assessed in those who have fully recovered, and cannot very well be separated from the symptoms of chronic illness when the latter is still present, in however mild a form. Such conclusions as have been drawn, therefore, about personality change are from the affective states alone, and only

from those whose condition was classified as "excellent." Alteration of that facet of intelligence which is measured by intelligence tests is not discussed here because many workers have shown that it is not altered. With regard to psychometric measurements of other kinds, it seems to the author that a practical study based upon the reactions of those who live with the patient and upon his performance in ordinary life should give a more useful type of information, and should avoid the introduction of unnecessary and complicating variables.

PERSONALITY CHANGE.

That the possibility of change in personality after leucotomy should arise at all is, of course, a logical consequence of the change known to follow injury or disease of the brain, and a few of the salient features may be mentioned here. The best known example is, of course, Harlow's crowbar case, in which marked personality changes followed an extensive bilateral frontal injury, the extent of which was reconstructed when crowbar and skull were jointly available. Jacobson's work on chimpanzees is equally well known, and was important in moulding the early attitudes to leucotomy. Rylander (1939) reported extensively on the effects of excision of parts of the frontal lobe in man, and believed that changes in personality often occurred which, though not enough to prevent a fairly normal social adjustment, might well be fatal to an intellectual worker. Cobb (1944) points out however that scrutiny of Rylander's case-histories shows that in these cases either both lobes were involved, or the clinical pattern was complicated by epilepsy. He concludes that there is little evidence in Rylander's cases of personality change after unilateral disease. Harrower Erickson, too (1940), judging personality by the Rorschach test, found abnormality to be correlated, not with local disease, but with general brain disturbance from pressure or displacement. Brickner's report of Dandy's case and Ackerley's report of Spurling's case (1935) have been quoted on many occasions. It will be remembered that in Spurling's case the left prefrontal lobe was destroyed by a large meningioma of the olfactory groove and the right prefrontal lobe was amputated to gain access to the tumour. The patient subsequently was explosively irritable, given to vulgarity, and showed difficulty in synthesizing or in remembering more than one detail at a time.

All this has been surveyed in admirable fashion by Hebb (1945) in the light of the readjustment of the famous "K. M.," in whom the frontal poles had been destroyed by a fracture. In the first report, one year after the operation, "K.M." was described as childish, obstinate and destructive. Six years after the operation she had become normal in every way. Hebb points the moral of this remarkable case, and discusses the methodological difficulties in analysing cerebral functions. It is always difficult to estimate the anatomical extent of destruction, and even more difficult to be certain about the pathological processes at work. Pathological changes continue after the operation, and it is difficult or impossible in these cases to be sure whether behaviour abnormality is due to loss of the tissue removed or to disease in that part of the brain which remains. He summarizes the position by saying that the

evidence for intellectual and moral defect after surgery of the frontal lobe due to the surgery alone is poor. He believes that this reasoning applies with equal or greater force to leucotomy.

Turning now to personality change after leucotomy itself, Freeman and Watts in their monograph (1942) describe inertia, lack of ambition, reduced self-consciousness, talkativeness and poor judgment in patients in whom the operation has been performed. They described a condition which Cobb has summarized as "fat, lazy, tactless and a little silly." However, they observe that considerable improvement may occur, and that such improvement may go on for years (Freeman and Watts, 1944). Cobb himself (1944) doubts whether any specific traits are lost, believing that the effect of the operation is to reduce the number of possible circuits for association.

Loss of the abstract attitude (Goldstein, 1942) has been considered in some detail by various authors because of the findings after brain injury, particularly in war. Halstead (1940) had found disturbed categorical thinking when the Rorschach and Binet were normal, though he states (1946) that this is not found after leucotomy. Kisker (1944 *a* and *b*) believes that this disturbance, when present, is an outgrowth of the psychosis, and exists before leucotomy is performed at all. Golla (1946) reports the objective mentality of these patients, and their ready response to environmental variations associated with little interest in remote possibilities. At most he says they are a little ruder and a little less sensitive to the feelings of others. The most notable feature he finds to be the absence of anxious self-questioning as to the ethical rightness of projected activity. He finds the patient guided by a conventional moral code which is not coloured by the usual emotional concomitants. He emphasizes, however, the flexibility and wholeness of the nervous system, and raises the point as to how completely these deficits repair themselves in time. With this in mind he lays great stress on the importance of after-treatment.

RESULTS.

Before considering the problem of personality change in the series under review, the results of the operations may be set out simply in tabular fashion. Three broad groups have been established, and the meaning attached to each may be briefly explained. By "excellent" is meant a degree of recovery as judged by personal examination, and by the reports of those with whom the patient lives and works, which is indistinguishable from normality. By "good" is meant that the patient could support himself, and live an essentially normal life, but that there is still evidence of some clinical abnormality. In this group would be included, for example, a patient whose depression had been cured, but who showed undue and hypochondriacal concern about himself. It would in general mean the presence of symptoms without appreciable loss of social efficiency. "Poor" means that despite the ability to live outside hospital—which is more often a function of the family than of the patient—he is not an efficient social unit. The patient does not work at all, or misses much time, or has taken work of a standard much below that which he was able to do before his illness. This latter group includes patients who would

still be in hospital if their families were unable or unwilling to care for them, and hence in the third table, cases labelled poor have been joined with those remaining in hospital and described under the new heading of "failure." "Success" in this connection is the sum of the cases falling in the categories "excellent" and "good."

The results in these 59 cases were as follows :

(1) Cases discharged from hospital :

Diagnosis.	Excellent.	Good.	Poor.	Total.
Depression	7	4	2	13
Paranoid schizophrenia	3	2	1	6
Hebephrenia	—	1	—	1
Catatonic schizophrenia	—	1	1	2

(2) Cases remaining in hospital :

Diagnosis.	Improved.	Not improved.	Total.
Depression	5	4	9
Paranoid schizophrenia	2	2	4
Hebephrenia	4	10	14
Catatonic schizophrenia	2	8	10

Taking the two tables together and combining those described as excellent and good under the heading successful, and combining poor with the groups still in hospital, we have :

Diagnosis.	Success.	Failure.	% Success.
Depression	11	11	50%
Paranoid schizophrenia	5	5	50%
Hebephrenia	1	14	6%
Catatonic schizophrenia	2	10	20%

PERSONALITY.

The possibility of personality change was considered with great care in the eleven cases of depression who made excellent or good recoveries. Only in these cases was it considered that there was a reasonable certainty that detectable personality changes would be separable from the effects in residual symptoms of the illness. The eleven case-histories would make unreasonable demands on space, and a representative history must suffice. It may be stated at once that none of the seven excellent recoveries showed any sign of personality change, and of the cases regarded as good recoveries, two were equally free from any appreciable alteration. Of the first group the following is a representative case :

CASE 17.—This patient had had a breakdown in August, 1935, when he was 30 years of age. He attempted suicide by drowning, following a severe depression of some months, during which he had been drinking heavily. On admission to hospital he was dull and conversed hardly at all; he believed everyone, including the staff and his relatives, was against him, and at times he became obscene and generally offensive. During the next five years he gradually sank into a dull, apathetic

state and muttered unintelligibly. He was described at one time as showing *flexibilitas cerea*. At the end of 1941, six years after his original breakdown, prefrontal leucotomy was performed. Six months later he was described as well behaved, but lacking in initiative, able to converse only a little, and as making very little attempt to occupy himself. A year later he was discharged, being at that time described as bright and cheerful, and confident about the future. After his discharge his conduct tended to be a little erratic and he drank a good deal. After a few months, however, he settled down and gradually improved. He is now employed as a salesman and doing very well. He is described by all who know him as completely fit and very efficient at his job. He is well mannered, with a ready flow of talk, brisk and alert, and shows a grasp and knowledge of the market in which he is interested, which is obviously of high quality. He is paid a salary which even in these days of inflated wages is an index of the regard in which he is held by his firm. He never gets depressed, and though he is irritable at times, this appears to be nothing more than is normal in the present state of the world. He says he has no greater confidence in himself than he had previously, and still has to struggle to overcome his natural self-consciousness when making a sale. His affection for his family is quite unchanged, and he has made such provision for his future as would be expected in a prudent man of his age.

The two good recoveries who showed some evidence of personality change will now be described.

CASE 20.—This lady was admitted to hospital in August, 1943, when she was aged 30. She had had a depressive illness six years before, which lasted for about six months. Apart from this she was a capable woman, of bright and happy temperament. This illness began fairly acutely, and on admission she was dull, indifferent and very restless; she did not converse at all spontaneously and was slow in answering questions which were put to her; she cried almost continuously, stating she was tired of life and she was in general severely depressed. It was thought that she was hallucinated, for she was stated to have said that she heard God tapping on the walls and heard him say to her, "Come to rest." In March, 1944, when her condition had deteriorated further, prefrontal leucotomy was performed. She was discharged four months later, and her relatives said that improvement continued for the next six months. At first she was subject to what were called "brainstorms"—an explosive irritability in response to environmental frustrations. She was handled, however, with tact and understanding by her family, and in recent years she has regained what the family consider to be full normality. It was clear, however, on examination that there was a certain loss of initiative and considerable lack of concern about future events. She was dealing very effectively with the present, but was letting life flow by her. It will be observed that the symptomatology shows some schizophrenic features, and it seems likely that such personality change as exists is related to this.

CASE 19.—This patient was admitted to hospital early in 1941, when she was aged 25. She was a single woman, who had lived with her mother, and was described as energetic, sensitive and highly strung. She had had a breakdown in 1938, which lasted for nearly a year. She had never fully recovered, and had been depressed, with a conviction that she had sinned. She felt unfit to go to church or to make her confession, and became very distressed, wandering continuously about the house, wringing her hands. She lost interest in her work and herself, and wished to die. She showed gross motor retardation on admission, and could give very little account of herself. She refused food, and although her symptoms were alleviated by electro-convulsive therapy, relapse occurred after a week or so. In January, 1944, more than five years after the illness began, prefrontal leucotomy was performed. Improvement showed itself almost immediately, and she was discharged three months later, regarded as recovered. She was described by her relatives as bright, alert and cheerful, and she found as much comfort in her religion as she had before her illness. On the other hand, she did less work than before the operation, and apart from a little cooking and cleaning, she tended to sit about the house doing nothing. She was previously extremely conscientious and fastidious both about herself and her surroundings, but is now inclined to be slack and careless in both respects. She is rather inclined to resent interference or criticism,

and is satisfied with herself to a degree that is not borne out by her performance. She tends to lie in bed late in the morning, and one of her sisters summed up the situation by saying that she was thoroughly pig-headed. This account was borne out by clinical examination. She was a careless and rather indifferent philosopher, enjoying life on a cognitive level, and well satisfied with herself and her performance. There has been no recurrence of the depression.

This is the only example in the series of an apparently pure affective illness in which a residual personality change could be detected. It would appear to be a true bill, and to be related to the leucotomy. The possibility of schizophrenic features in the original illness must arise of course, but the author was unable to satisfy himself on the point so long in retrospect."

Thus in eleven cases, nine showed no sign of personality change, and of the two who did show such change, this was in one case thought to be related to the schizophrenic colouring to the illness. There was no indication of inertia, for all were working productively and as well as before the illness. A reasonable and appropriate self-consciousness can be developed by any of them, it is considered, on the scale and in the circumstances that would have sufficed before the illness. None was apparently an embarrassment because of lack of social judgment, and indeed the "fat, lazy, tactless and silly" syndrome was not evident at all, except that many of them had in fact gained weight. This is not to say that defect had not *been* present, for it is clear from the histories of many that there had been difficulties in adjustment in the first year or two. But it seems clear that reorganization, given adequate time and good surroundings, can progress to the ultimate degree with a restitution that appears to be total. The importance of a good home environment, or in its absence, purposive rehabilitation needs no stressing; and it must be remembered that full recovery, as in some of these cases, may take two or three years.

SYMPTOMATOLOGY IN DEPRESSIVES.

Scrutiny of the case-histories of the seven cases assessed as excellent shows the following features present in all:

- (1) Good personalities and fairly good work records prior to illness.
- (2) Average intelligence or above and an absence of secondary dementia.
- (3) A low incidence of hypochondriasis which, if present at all, was recent, not very prominent and not of delusional intensity; in particular, the hypochondriasis was never bizarre.
- (4) An absence of schizophrenic features, especially hallucinations and passivity.
- (5) Neither the length of the illness nor the age of the patient were consistent.

The four cases described as good showed the following features:

CASE 4.—The personality here was distinctly unstable, though the work record had been fairly good. The patient had been known as domineering and defiant, addicted to drink, and had frequently taken drugs to bring on miscarriage. She had always been a hypochondriacal personality, and this is still evident, though without any effective disability.

CASE 5.—This patient, too, had been described as "always ailing" and had been an insecure and dependent individual. In her case, too, her efficiency was good, though she still tended to regard herself as a semi-invalid and to make considerable demands on those who lived with her.

CASE 19.—This case is reported above.

CASE 20.—This case shows schizophrenic features with hallucinosis, and a tendency for the hypochondriasis to be rather bizarre in quality.

The results categorized as poor were two in number, and showed the following :

CASE 15.—This man's father died in a mental hospital, and during his school days he was continually in bad health. He never learned to read or write, and was an unsociable, petulant dullard, with an ingrained habit of grumbling. Hypochondriasis was severe during his illness. Although now able to live at home he is still disgruntled and unco-operative. He changes his work continuously to branch out into unproductive schemes, such as breeding rabbits, and none of these schemes are ever pursued with any success. He says he feels more dead than alive, and is constantly blowing up, losing the feeling in his fingers, and suffers burning inflammation all over his body. His family say he is incapable of worrying about anything, but will talk for ever about his complaints.

CASE 1.—This case is described below.

The depressives who still remain in hospital show the following features :

CASE 28.—A marked arteriosclerotic dementia.

CASE 29.—This patient had been 13 years ill, and the illness showed marked paranoid features. Considerable secondary dementia is evident.

CASE 36.—Hypochondriasis was severe and bizarre. She said that her body was filled with chalk, and the only treatment that would help her would be to burn her with red hot poker, or to file her body away. She felt sure that God had condemned her to live for 5,000 years as a punishment.

CASE 37.—Marked secondary dementia.

CASE 40.—Hallucinosis was marked in this case. She was 62 on admission.

CASE 43.—In this case also the patient complained of the devil swearing at him and telling him he would never get well. He continues to say that he is not alive, as he was hanged in gaol long ago ; the person talking to the examiner is the devil himself. He was 56 on admission.

CASE 46.—A very insecure personality with a long history of hypochondriasis, which symptoms were more marked when his illness developed.

CASE 54.—Hypochondriasis was very marked. She complained of her inside falling to the ground every time she stood up. Schizophrenic features were prominent.

CASE 56.—Agitation was extremely prominent, and secondary dementia became very marked later.

SYMPTOMATOLOGY OF SCHIZOPHRENICS.

In only one case of hebephrenia and one case of catatonic schizophrenia could the result be classified as successful, and these may be briefly disposed of.

The hebephrenic had been ill for just over a year when the operation was performed, and interesting features were the excellence of the home surroundings and the fact that she had made a recovery six years before from a brief schizophrenic illness. Her parents took enormous trouble with her, and appear to have directed her rehabilitation along excellent lines. She was encouraged in her hobbies, was given reasonable freedom, and arrangements were made for her to attend evening classes and have private tuition. She is content and placid, and holding down a secretarial post with success.

The catatonic case showed a similarly favourable home environment and improvement had been very slow. A placid and rather inert individual resulted, but again social efficiency was reasonably good.

The paranoid schizophrenics are a rather more important problem in this series, as in three cases the result was regarded as excellent. The distinguish-

ing features between those who have recovered and those who have not are not as clearly marked as in the case of the depressives, but certain tentative observations can be made.

The three cases classified as excellent were :

CASE 7.—The personality here was excellent.

CASE 9.—Depressive features were very marked indeed during the illness.

CASE 18.—The personality was very good.

The cases classified as good were :

CASE 12.—The result here was one of placid and cabbage-like inertia, but with reasonably effective social adjustment. Nevertheless the case is rather an extraordinary one, as the history will indicate. The patient was admitted to hospital in 1936, when she was 26 years old. She had become introverted and preoccupied with religious matters and with psychology for some time. Quite rapidly she sank into a dull, indifferent condition, punctuated by outbursts of impulsive violence. She was obviously hallucinated and was very destructive. Her habits became faulty and she relapsed into a state of inactivity. She became more active later, and developed the symptoms of florid paranoid schizophrenia. At the end of 1943 prefrontal leucotomy was performed, nearly eight years after her illness began. She gradually improved, and enormous efforts were made on her behalf by the hospital staff. A year and a half after operation she was discharged and since then has lived at home, giving effective help in the house. Apart from her inertia she maintains good contact with her environment, and when seen she made some penetrating criticisms of the food situation, and showed a detailed knowledge of the regulations governing the rationing of food. She is symptomless.

CASE 3.—This was somewhat similar to Case 12.

Of the cases classified as failures, one was living outside hospital and four were still in-patients. The first of these was a nervous, shy, paranoid personality as far back as his development could be traced. In all four cases remaining in hospital passivity was a marked feature.

It is clear that leucotomy offers little hope of recovery in chronic catatonia and in hebephrenia. It seemed in this series that a bad prognosis is associated with a high incidence of passivity, with early confusional pictures and with a pseudo-neurotic onset. In the main, of course, these features correspond with the types of schizophrenics known to have a bad prognosis quite apart from leucotomy.

RETURN OF SYMPTOMS.

Return of symptoms after apparent cure has seldom been reported, and the following case is of some interest :

CASE 1.—It was said that symptoms had been developing for some nine years before admission in 1940, when the patient was aged 33. He was described as morose and unsociable, and had become progressively more concerned with the possibility of his suffering from some serious disease. He had been treated by his own doctor for many years. He refused to allow the wireless to be turned on in his presence, and could not bear any clock in the house to strike. Just before his admission he had been staying in bed all day except once a week, when he got up and went out for a hair-cut. Recently he had begun to refuse food. He made no improvement and, early in 1942, 18 months after his admission and some 11 years after the onset of the illness, prefrontal leucotomy was performed. Three months later he was described as working well, happy and free from symptoms. He was discharged five months after the operation, and his recovery very soon became complete. He put on a good deal of weight, returned to work, and has held the same job during the last five years, and has apparently given complete satisfaction. He married two years

after his operation, and the marriage appears to have been a complete success. His wife describes him as having been a cheerful and amiable partner, very considerate and thoughtful, and everything she could desire. This happy state of affairs, however, was only continued until about a year ago. Since then he has begun to feel that his brain is working all the time, and he counts every footstep he takes. He is acutely unhappy unless he puts books down in exactly symmetrical fashion. He cannot bear to shave unless his routine is absolutely fixed and unalterable. He finds that he must adjust his tie when starting a new task, otherwise he becomes uneasy. His evenings now are spent unhappily, for he finds himself ruminating on what he has done during the day and wondering whether he has left undone any of the things he ought to have done. He feels fearful about his ability to cope with the morrow. At the same time he has lost all his fears about his physical health, and distinguishes quite clearly his feelings of uneasiness from depression, from which he now never suffers.

On reviewing the history, it is difficult to be certain whether the diagnosis would not more properly have been described as an obsessional neurosis. Certainly his condition at the present time is that of an obsessional state. It is interesting to observe the complete cure which followed the operation with the gradual reorganization of his basic personality pattern, followed by the reorganization of the morbid pattern which characterized his illness. A similar state of affairs was observed in cases Nos. 16 and 22. In the former of these a paranoid schizophrenic, after a slow recovery, gradually developed his illness again in much the same way as on the first occasion. In Case 22, a catatonic schizophrenic, after nearly three years' excellent adjustment, during which she returned to full-time employment as a nurse, gradually disintegrated and is now as ill as on the first occasion. It is clear that the concept of the brain as a whole organ leads not only to the recognition that the personality may be reorganized after the operation, but that morbid patterns which have been well stamped in may re-assert themselves. Over a period which is admittedly much longer it is quite possible that leucotomy may produce cures which are limited in duration, as are those of E.C.T. and other physical methods of treatment.

DISCUSSION.

It seems reasonably certain then that personality change after leucotomy and ascribable to the operation alone is not permanent, and given cure of the illness and reasonably good rehabilitation, a restitution of the premorbid personality may be expected. Full restitution will, however, take time, and may require as much as two or three years. If surroundings at home are good then discharge from hospital as early as possible seems the obvious course, with the provision of such help as is possible from out-patient services, and assistance in placing in suitable employment. If the home is bad and the patient likely to be unwelcome or neglected, then rehabilitation of a purposive kind in hospital should be continued for a year or more.

In the matter of prognosis, no generalization can be made here either about diagnostic groups or their subdivisions. The figure given here for example, that in 50 per cent. of depressive cases success followed operation, can be of no general importance. In the first place the series is relatively small, and secondly no indication is given here—nor would it readily be available—as to how these cases were selected for operation. Nor is it clear how representative

the series is of the class of depressives as a whole. With these limitations in mind, however, certain tentative conclusions may be drawn.

In depression, a good personality, free from lifelong morbid patterns of reaction, and average intelligence is essential if a good prognosis is to be given. Heavily emphasized hypochondriacal reactions or bizarrerie are bad omens, and equally so are schizophrenic features and organic dementia. In the case of hebephrenic and catatonic reactions, it seems doubtful whether the operation is worth doing unless circumstances are quite exceptional; in paranoid schizophrenia the operation seems to offer reasonable hope if the pre-morbid personality was good, and particularly if passivity and catatonic features are not prominent.

It is well to remember that the curative effects of leucotomy may not be permanent, and the reorganization of disease patterns shown in three cases in this series, after a long period of comparative fitness, may prove to be a not uncommon phenomenon with longer observation.

SUMMARY.

1. A series of 59 cases on whom prefrontal leucotomy has been performed has been surveyed.
2. It is believed that no permanent personality change occurs which is ascribable to the operation alone. Restitution may, however, be slow, and its speed depends materially on the possibility of rehabilitation, particularly in the patient's own home.
3. Factors are indicated which appear to correlate with recovery, and others which appear to be associated with failure.
4. It is noted that an apparently perfect cure after leucotomy is not always permanent, even when maintained for some years.

I have to thank Dr. R. E. Hemphill, Medical Superintendent, for permission to publish the paper. The task of tracing these patients, some of whom had moved several times during the war, was an arduous one, and my warmest thanks are due to Mrs. M. I. Grant and Mrs. M. Crotty for their perseverance and patience during the investigation.

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DELINQUENCY AND EPILEPSY: A CLINICAL AND ELECTROPHYSIOLOGICAL NOTE.*

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THE neuropsychiatrist presenting evidence before Court will sooner or later be asked the question, "Was the accused, at the time of committing the offence, labouring under such defect of reason as that he did not know what he was doing, or if he knew what he was doing, he did not know it was wrong?"

Two points of difficulty arise within the question which may be susceptible of clarification: the third remains elusive.

The first lies in the phrase "at the time of committing the offence": the second in "that he did not know what he was doing."

To both these points an answer may commonly be given, though probably in the form of a reasoned inference based on the facts emerging on examination.

Discussion of the attitudes implicit in the third phrase, "that if he knew what he was doing he did not know it was wrong," may involve a disquisition on the accused's appreciation of morality which is fraught with difficulty, and where concise interpretation remains elusive.

When a medical witness can give it as his opinion that an accused person is suffering from epilepsy or some other recognized mental disorder the Court will commonly accept that evidence in mitigation of the offence.

It should never be forgotten that the function of a witness is to offer his evidence, based on such examination as satisfies him—if necessary in the form of reasoned inference from observed facts—while the onus of acceptance or rejection of such evidence and the decision as to the disposal of the case falls entirely upon the Court.

In an attempt to study further the evidence required to answer questions relating to a person's knowledge "of what he was doing" "at the time of committing the act," 140 records of persons of all ages and both sexes were reviewed.

The subjects had been referred for examination following an anti-social act varying in gravity from "being beyond control" to "attempted murder."

Careful study has been made of the electro-encephalographic records of these persons under conditions of "rest" and "stress."

The full investigation of such a case necessarily involves electroencephalographic studies paralleled by biochemical and psychiatric investigation spread over a period of time and conducted within a controlled environment throughout (Hill, D., and Sargant, W., 1943, *Lancet*, and Sessions Hodge, J. *Ment. Sci.*, 1945, **91**, 385), but the curtailed examination detailed here has been found to yield suggestive results.

* A Paper read at the Quarterly Meeting of the Royal Medico-Psychological Association, Gloucester, on 14 May, 1947.

For the purpose of this inquiry attention was directed to those cases which could be considered "epileptic": firstly those on "clinical" grounds, secondly those on "biochemical" grounds, and thirdly those on "electrophysiological" grounds.

TABLE I.

Total Records.

Children ("Children and Young Persons Act").		Adults.	
Normal	24	Normal	25
4-7 c.p.s.	33	4-7 c.p.s.	21
"Epileptic"	33	"Epileptic"	4
Total	90	Total	50

Full total, 140.

TABLE II.

"Epileptic" Records.

Children.		Adults.	
Clinical fits.	10 (7.1%)	Clinical fits	1 (0.7%)
Loss of consciousness	5 (3.5%)	Loss of Consciousness	1 (0.7%)
"Epileptic" records	18 (12.8%)	"Epileptic" records	2 (1.4%)
Total	33 (23.4%)	Total	4 (2.8%)

TABLE III.

Age Groups in Years.

	<6.	6-10.	10-14.	14-17.	17-25.	>25.
Clinical fit	3	1	4	2	1	0
"Loss of consciousness"	0	3	2	0	0	1
"Epileptic" record	0	5	11	2	2	0
Total cases	3	9	17	4	3	1

The first group satisfied the criterion that they had had one or more observed and recorded clinical fits, either "major" or "minor." This group showed an EEG record characterized by either a peak of energy in the 1.5-4 c.p.s. band which became dominant during hyperpnoea, spread to both frontal areas and persisted for 20 seconds or more following the cessation of hyperpnoea, or a typical "spike and wave" complex with associated spectrum analysis. This group represents 7.8 per cent. of the total.

The second group, none of whom had ever—so far as inquiry could elicit—had a clinical fit, suffered a clouding, diminution or loss of consciousness during hyperpnoea. The onset of this state—characterized by failure to respond to a simple and clearly given command—was preceded for 2 seconds

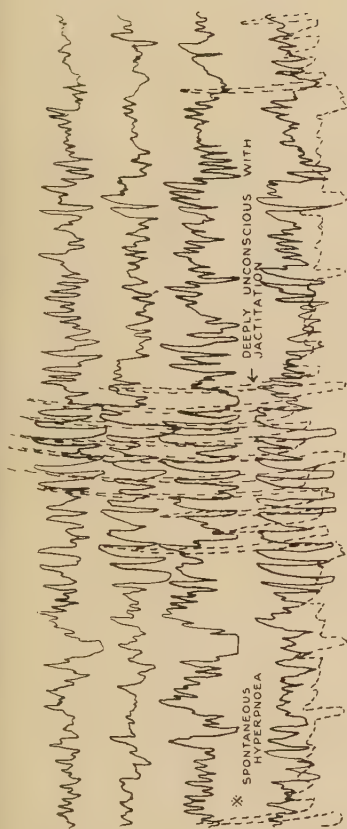


PLATE A.

Example of "loss of consciousness" in a subject referred for repeated delinquencies and "being beyond control"—episodic acts of violence but *no* clinical "fit" ever reported or observed prior to examination. (Trace 2 analysed).

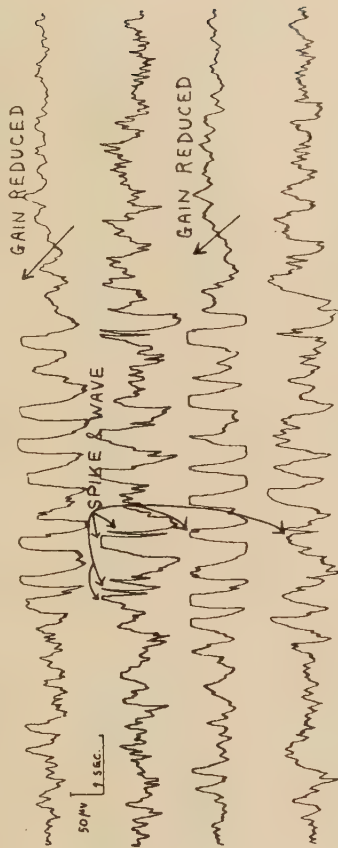


PLATE I.

Example of "spike and wave" record in primary E.E.G. trace. History of repeated delinquencies and larcenies, breaking and entering, truancies and "being beyond control." *No* history of "fits" obtained: minor attacks subsequently observed when under observation on remand.

Comparison with further control groups has been made. Dovey (*Proc. E.E.G. Socy.*), in a study of EEG records of 106 unselected normal children aged from 6 months to 10 years, stressed the difficulty of interpreting these "young" records in the light of experience with adults, but states (private communication) that in spite of the occurrence in this group of records showing many "anomalies and 'instabilities'," only two records were considered to be of the "epileptic" type. It is perhaps of importance to state that, of the three children whose cases are reported here in the "under 6 age-group," all had clinical fits. Records have been taken of an unselected group of 109 schoolboys aged 11 to 18 years. Of these 5 (4.5 per cent.), had EEG records which were comparable with those in the third group previously described (Sessions Hodge and J. A. Maddocks).

If the foregoing figures can be accepted it would appear that we have here a group of persons (Table II) subject to episodic disturbance, such disturbance being in the nature of widespread cerebral dysfunction which at some point disturbs cortical integration. This disturbance may be related to consciousness, and, as has been shown, can amount to a diminution, clouding or loss of consciousness. The finer degrees of such a disturbance will need to be the subject of further investigation, and this is projected.

If an accused person is found to exhibit such phenomena, it should be possible to infer that "at some material times" he was in such a state as "that he did not know what he was doing." If by careful reproduction of the alleged circumstances of the crime it can be demonstrated that the necessary factors favouring such an episodic disturbance were present (if, to borrow a phrase from the old Astrologers, "the required [aetiological] constellation were in conjunction"), then one might reasonably infer that "at the time of committing the act" the accused "did not know what he was doing."

The third point remains elusive—"that if he knew what he was doing he did not know it was wrong."

An appreciation of right and wrong must surely involve many factors in the individual's internal and external environment: constitution, birth, upbringing and intellectual endowment being but some. Sherrington has said that "what the mind is concerned with is not the act but the aim" (Sherrington, *Man on His Nature*). There is a wide gulf fixed between the act of pulling the trigger by flexion of a forefinger and hitting the target, with all that that implies in consequence.

It is possible that we are concerned not so much with a lack of knowledge of right-doing and wrong-doing as with faulty inhibition, and that further light may be thrown upon this with the extension of investigation in frontal lobe function.

It is possible also that delayed or disturbed cerebral maturation is another cogent factor. This may account for the higher incidence of the observed disturbance in the juvenile groups. Should this prove to be so then yet another reason is added to the many in favour of extended observation, control and treatment of the young delinquent, and further reinforces Prof. D. K. Henderson's plea for "an indeterminate sentence, discharge to be dependent not upon the expiration of time but upon the proper establishment of adequate

social patterns." In this plea I concur, and would stress the value of repeated coincidental psychiatric and electrophysiological examinations.

One may perhaps add that even so restricted a study as this clearly indicates the need for further research and contemplation.

The electro-encephalographic findings are, after all, a graphic representation of electrical activity of cerebral tissue. They require to be considered together with both biochemical and psychiatric estimations in every case.

It would be improper at this stage to speak of an "epileptic record" save with the reservation that the nature of "epilepsy" is not yet understood, and that lacking the evidence of a "seizure," we can only state the nature of the electro-encephalographic findings and await their association with other morbid phenomena.

Investigation of the delinquent's appreciation of "morality" probably poses the most difficult question.

Trotter in his paper, "Has the intellect a function?" speaks of the "calibration of the intellect," thus indicating the need for a positive effort at attaining functional cerebral unity. If this desideratum be possible it will surely imply the possession of adequate neuronc substrate not liable to episodic disturbance.

Finally, let it be re-emphasized that this communication should be regarded as tentative and indicative, and that—to quote Trotter again—" . . . the man of science within his own, often narrow, department can cheerfully view all his knowledge as provisional only and indefinitely liable to subversion by further inquiry. . . . "

It is my pleasure to thank Dr. J. F. Davidson, Medical Officer of Health, Somerset County Council, for the use of case-material, my colleagues Dr. and Mrs. Grey Walter for their encouraging help on all occasions, and lastly Professor F. L. Golla for his unfailing and stimulating encouragement and bracing criticism.

SUGGESTIBILITY AND PERSISTENCE IN EPILEPTICS AND MENTAL DEFECTIVES.

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(1) INTRODUCTION.

IN recent years many attempts have been made to improve methods of temperament testing, and to show the validity of the results by comparing test-scores of groups of subjects known to be differentiated with respect to certain traits (Cattell (1), Eysenck (2), Himmelweit (5)). Thus there has been found a very significant correlation between degree of neuroticism and suggestibility, and a correlation almost as high between degree of neuroticism and persistence. These results have suggested the possibility of using tests of this kind in an attempt to measure the neurotic tendencies of individual subjects, and to screen the more neurotic from types of occupation likely to impose too great a strain on them (Eysenck (3)).

Such a plan is feasible only on condition that the tests are able to discriminate not only between normal and neurotic subjects, say, but also that they should discriminate between neurotic disorders and others which are not being investigated. In other words, tests, in order to be maximally useful, must be specific; they should measure one factor, trait or ability only, and not a mixture of different and diversified characteristics. Thus if it should be found that suggestibility is heightened not only in neurotics, but also in psychotics, mental defectives, epileptics, etc., the value of the test as a measure of neuroticism would be seriously impaired. Previous work has shown that psychotics do not react to the suggestibility test in a manner similar to neurotics (Williams (9)); the present report is concerned with the behaviour of epileptics and mental defectives.

(2) THE EXPERIMENT.

Clinical studies of the behaviour of epileptics and mental defectives have led to certain conclusions regarding the extent of their suggestibility and persistence; for example, it is widely held that the "ready suggestibility" of mental defectives may lead to their committing criminal offences through their becoming the dupes of people with more astute minds. Regarding the personality traits of epileptics opinions vary and are sometimes apparently contradictory: "He (the epileptic) gets his own way by persistence or by a fixed attitude of non-co-operation" (Clark (6)); "He has no tenacity of purpose although his verbal ambitions are boundless" (Clark (6)). It would be interest-

ing to investigate these two temperamental traits experimentally, in so far as they are accessible to experimental study.

From the results of previous experimental studies some investigators have come to believe in the existence of different types of suggestibility. As many of these studies used rating scales and questionnaires as validating criteria some doubt has been cast on their validity. For the purpose of experimental investigation it seems desirable that a test of suggestibility should take the form of a controlled situation in which the subject is given a suggestion and it is observed whether or not his behaviour is affected by it.

Many tests of this type have been devised, the earliest being "Chevreul's Pendulum" test, in which the subject is asked to hold a small weight suspended from a string over a line drawn on the table. He is told that the weight will begin to swing along the line. The extent of the arc which the weight describes while the subject is holding the string constitutes his score for suggestibility. The basis of this and other *ideo-motor* types of suggestibility test is that the suggestible subject, on having it suggested to him that a certain movement will take place without his conscious participation, is led to execute that movement unconsciously. Another widely used test of this *ideo-motor* type is Hull's Body Sway test, in which the subject is told to stand quite still and relaxed while a gramophone record of a repeated suggestion is played to him: "You're falling forward; you're falling forward all the time; you're falling forward now . . ." The amount of sway consequent on the suggestion of the record is measured in inches, and constitutes the suggestibility score of the subject. This test has been found effective for use as a screening test for neurotics, differentiating successfully between normal and neurotic subjects. It has been established that neurotics are significantly more suggestible than normals, and that, contrary to a widespread impression, hysterics are not more suggestible than other neurotics (Eysenck (2)).

In this study, by applying Hull's Body Sway test to a group of epileptics and mental defectives it is expected to establish whether they are significantly more prone to be affected by primary suggestibility of the *ideo-motor* type than the normal population. The suggestibility observed by the clinician may be a complex of several factors, and the relation of the suggestibility tested by the test to the general concept "suggestibility" remains to be carefully examined.

Regarding the nature of the trait "persistence" opinions are divided. Some writers (Ryans (7)) incline to the view that there is a general factor of persistence; Thornton and Guilford (8) report results favouring a multiple factor theory. A simple test of persistence is to measure the length of time for which the subject will maintain a painful or fatiguing posture, being free to abandon that posture whenever he pleases. "However the evidence regarding the existence of a general factor covering the whole field of persistence may be evaluated, there is little doubt that various tests involving the continuance of bodily posture in spite of fatigue and pain induced by that posture correlate together, and define a group factor which can be measured with relative ease" (Eysenck (2)).

In the test of persistence used in this study the subject was seated in a

chair and instructed to hold one of his legs extended over the seat of another chair. He was instructed to hold his leg up as long as possible, and the time elapsing until his heel touched the seat of the chair was recorded in seconds.

(3) DESCRIPTION OF THE POPULATION TESTED.

106 male mental defectives, 94 female mental defectives, 13 male mental defectives classed as "difficult" (behaviour problems, possibly psychopathic), 100 male epileptics, 100 female epileptics, were tested individually with these two tests.

In the mentally defective group the average age of the female patients was 29.5 years, range 17-56, average age of male patients 37.9 years, range 17-59. The patients were chosen from the I.Q. range 50-70 and were capable of understanding simple instructions. The "psychopaths" (this label was only tentatively applied) were cases showing gross disorders of conduct, most having a record of conviction for some offence and all difficult to handle, their behaviour tending to indicate that some defect of personality might be superadded to their defect of intelligence.

In the epileptic group the average age of the female patients was 33.4, range 17-58, the average age of male patients 36.6, range 18-52. The patients selected were epileptics otherwise normal; feeble-minded, deteriorated, psychotic and neurotic cases were excluded.

(4) RESULTS.

The histograms below illustrate the distribution of the suggestibility scores of the mental defectives and epileptics; the histograms of a group of 100 normal subjects and of 1,230 neurotic subjects investigated by Eysenck are shown alongside. The resemblance of the histograms of both sections of the experimental population to that of the control group of normal subjects and their difference from that of the neurotic group are striking.

The results were as follows :

Body Sway test (excursus measured to the nearest inch) :

Mental defectives :

Mean score, male	1.22	} mean score M.D. $1.19 \pm .37$.
" " female	1.17	

Epileptics :

Mean score, male	1.43	} mean score Ep. $1.43 \pm .94$.
" " female	1.43	

Statistical investigation of these scores showed that neither of the experimental groups was more suggestible than the control group. Applying the χ^2 technique to the scores of normals compared with those of epileptics and mental defectives the results were :

Normals compared with epileptics :	$\chi^2 = 2.38$ (d.o.f. = 3).
" " defectives :	$\chi^2 = 2.95$ (d.o.f. = 3).

There was no significant difference between the scores of epileptics over and epileptics under the median age. Similarly, with the mental defectives, there was no significant difference between the older and younger.

Comparing the total epileptic with the total defective population no significant difference was found ($\chi^2 = 1.93$, d.o.f. = 3); comparing the total male with the total female population a slight significant difference was found ($\chi^2 = 5.65$, d.o.f. = 3), indicating that the women were slightly less suggestible than the men.

The results of the tests of persistence were :

Mental defectives :

	Seconds.	
Male	120.01	} mean score 97.63 ± 20.4 .
Female	75.24	

Epileptics :

Male	88.57	} mean score 101.44 ± 18.6 .
Female	114.32	

These persistence scores are significantly higher than those obtained by A. Petrie from a group of male and female neurotics (Eysenck (2)), showing that this test, like the suggestibility test, appears to be relatively specific for neurotic disorder. Her data were obtained from 25 male and 25 female hysterics, and from 25 male and 25 female dysthymics. The results in seconds were as follows: The two hysteric groups gave average scores of 14.1 ± 9.6 and 13.9 ± 9.7 , while the two dysthymic groups gave scores of 29.1 ± 20.8 and 32.5 ± 25.9 . Altogether the hysterics persisted for 14.0 ± 9.4 secs., while the dysthymics persisted over twice as long. The mental defectives (average score 97.63) and the epileptics (average score 101.44) showed far greater persistence, but the range of scores was very wide—from 2 to over 800 seconds. The non-significant correlation between suggestibility and persistence scores ($-.07$ and $.03$ respectively for the E. and M.D. groups) showed that there was no tendency for individuals having high suggestibility scores to have high persistence scores, nor for high suggestibility scores to be consistently linked with low persistence scores.

(5) DISCUSSION OF RESULTS.

In appraising the significance of the results of the test of suggestibility, it is necessary to consider the relationship of the "suggestibility" which is apparent to clinical observation to the "suggestibility" measured by this test. Is suggestibility in the clinical sense a unitary trait measurable by experimental methods? Eysenck in *Dimensions of Personality* gives a summary of the findings of earlier workers on this subject. His own work on tests of suggestibility has led him to the conclusion that there is no general trait of suggestibility, but that there are at least two, probably three, main factors in the tests commonly used to measure suggestibility: "Primary suggestibility" of the ideomotor type—its distinguishing feature is "the execution of a motor movement

by the subject concerned consequent on the repeated suggestion by the experimenter that such a movement will take place, without conscious participation in the movement on the subject's part" (Eysenck (2))—"secondary suggestibility" ("gullibility"); and "prestige suggestibility"—a tendency towards change of opinion following on learning the opinion of someone who has high prestige for the subject. Primary and secondary suggestibility have been shown to be quite uncorrelated and independent (Eysenck (2); Eysenck and Furneaux (4)). The independent position of prestige suggestibility is still doubtful: "It is possible that when this question is tackled experimentally prestige suggestion will show little connection with primary suggestibility" (Eysenck (2)).

It is evident from the results of this investigation that mental defectives and epileptics are no more liable to be influenced by primary suggestibility than normal subjects, and much less so than neurotics. The conclusion is that an integrated personality, even when intellectually subnormal or suffering from a fairly incapacitating organic disturbance, is not on account of such handicaps rendered more susceptible to primary suggestibility. A disturbed personality (psychoneurotic) is distinctly more liable. The results of this investigation therefore confirm the value of Hull's Body Sway test as a screening test for neurosis.

As the independent position of prestige suggestion has not yet been established, it is worth while considering what information these results yield regarding its nature. It is clear that epileptics and mental defectives are no more susceptible to primary suggestibility than normals. What suggestibility is found in these two groups must be due mostly to secondary suggestibility and prestige suggestibility, which two factors are, it is expected, much more closely related to each other than primary suggestibility is to prestige suggestibility; it may be that together they form a "social suggestibility" syndrome distinct from the ideo-motor type of suggestibility. It seems a possibility that these two experimental groups were relatively susceptible to this type of suggestibility. As long-institutionalized patients they aim at being "good" and earning approval; many of the remarks they made indicated this, and it is quite possible that the suggestion of the examiner in saying "Stand perfectly still" before playing the record had more weight with them than the suggestion of the voice on the record. Many patients openly dramatized the situation or treated it as a competition—"He couldn't make me fall!" This eager spirit of compliance would account also for their remarkably high perseverance scores; they must have been trying much harder than the neurotics and further, if it is taken that the "will-power" tested by this test is a function of the integrated personality and liable to be affected by neurotic disorder (but not by mental deficiency or an epileptic disorder), the difference between the perseverance scores of the neurotic group and the two experimental groups is in line with the conclusion drawn from the difference between their suggestibility scores.

Clinical impressions of the behaviour of 200 selected subjects in a standardized situation may be allowed some weight, although not the validity of a measurable score. The female epileptics gave the impression of being the most

suggestible group; they largely tended to dramatize the situation, and were anxious to do well and pleased when they "survived" the test. The remarks they made about their medicine and treatment were often simple and childlike. Not all of the subjects in this group who admitted feeling affected by the suggestion actually swayed more than the normal amount. The following instances are taken from the female epileptic records:

"Makes me feel sick" (swayed $1\frac{1}{2}$ in.).

"Makes me feel dizzy" (swayed $1\frac{1}{2}$ in.).

"Makes me feel giddy" (swayed 4 in.).

"Makes me feel all hot" (fell outright).

A sway of up to 3 in. is taken as a normal score.

Two triumphant survivors: "I don't want to fall, lady; I like to be a good girl as long as I can" (swayed $1\frac{1}{2}$ in.). "I'm very good at my nerves; I'm not frightened of insects or anything like that" (swayed $\frac{1}{2}$ in.). No similar remarks were made by any other group.

Two cases (male mental defective and male epileptic) swayed right forward on the commencement of the record and had to be prevented from falling. They explained that they thought that the examiner wanted them to obey the record. On repeating the instructions and re-starting the record the mental defective swayed $6\frac{1}{2}$ in. and the epileptic $4\frac{1}{2}$ in., showing that they were highly susceptible to primary suggestibility, but not to such an extent as to be induced to fall outright. Here it seems that the command "Stand still" was acting against the suggestion "Fall forward"; while under the impression that the examiner required it of them they were willing to fall right forward.

Eysenck (2), comparing the body sway scores of 160 men and 160 women, showed that the men were approximately twice as suggestible as the women. In this investigation only a slight significant difference was found between the scores of the men and the women. In Eysenck's paper an attempt is made to account for the difference in terms of the ideo-motor theory of action. Another likely cause of the difference was found in the clinical impression that on the average the women referred to the hospital where his investigation was carried on were less seriously neurotic than the men. This impression is confirmed by the results of this study, in which neurotic disorder is eliminated as a factor; the result was a far smaller difference in the suggestibility scores of the male and female subjects; the difference, though slight, is still significant, and may be due to the greater predominance of ideo-motor imagery in male subjects.

The 13 "difficult" (psychopathic?) boys in the mentally defective group (although the number is too small for any reliable conclusion to be drawn) all had a much lower score than average on the suggestibility test, indicating that their conduct disorder was not the result of neurosis; this is evidence (slight and unreliable) for the view that the syndrome of psychopathic personality is distinct from and perhaps unrelated to neurosis. These boys were distinctly non-suggestible in the clinical sense; they were leaders rather than led among the troublesome patients, and had shown a fair degree of independence and initiative in their extra-mural criminal activities. One boy was recorded as having "lived by his wits"—no small achievement for a certifiable mental defective.

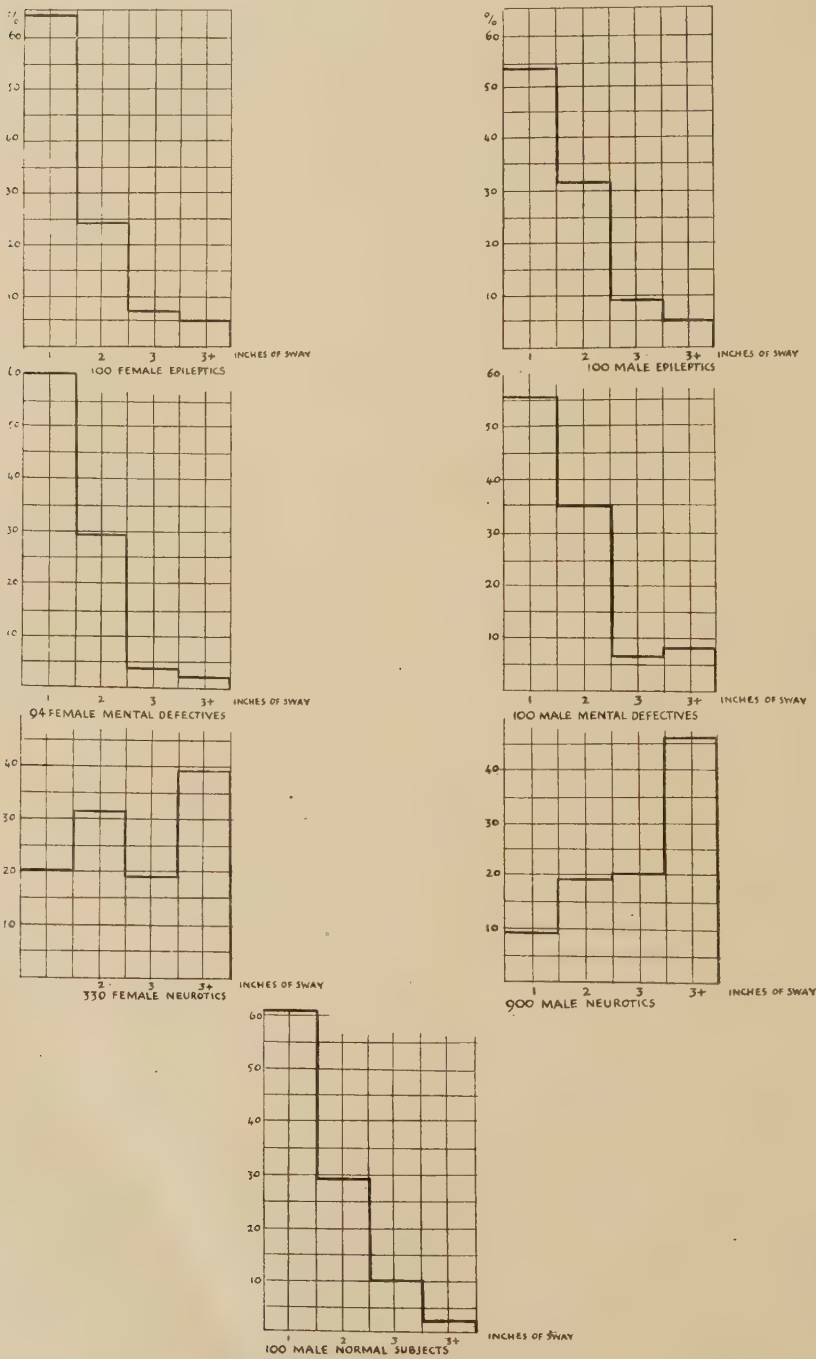


FIG. 1.—Body Sway in inches of normal, neurotic, epileptic and mental defective groups. Comparison of suggestibility scores of normal and various groups of abnormal subjects.

On the whole the results of this study tend to confirm the ideo-motor theory of action in its explanation of the phenomenon of primary suggestibility—that primary suggestibility is the product of ideo-motor action restrained by inhibition. Neurotics are defective in this voluntary control, not, however, mental defectives and epileptics. A strong integration of impulses may yet be possible at a low level of efficiency, even in the face of such serious defects as a fairly severe degree of mental deficiency or a nervous disorder of an epileptic type. The “lack of will-power” demonstrated by the neurotics in contrast to the high perseverance scores of the epileptics and mental defectives gives confirmation to this view.

I am glad to have this opportunity of acknowledging the helpful interest and co-operation of the Medical Superintendents of the Manor Institute for Mental Defectives, Epsom, St. Faith's Epileptic Colony, Brentwood, and St. David's Epileptic Colony, Edmonton, whose patients acted as subjects in the investigation, and of thanking Dr. Eysenck, at whose suggestion this study was undertaken, for his constructive criticism.

(6) SUMMARY.

1. Hull's Body Sway test of primary suggestibility and a simple motor test of persistence were administered to a group of 106 male, 94 female mental defectives, 13 male mental defectives classed as “difficult” (psychopathic?), 100 male, and 100 female epileptics. Their scores were compared with those obtained by Eysenck for normal and neurotic subjects, and with those obtained by Petrie for hysterics and dysthymics.

2. The epileptics and mental defectives were not significantly more suggestible than the normal group; they were significantly less suggestible than the neurotic group. On the average they showed much higher persistence scores than the neurotics.

3. Male subjects were found to be significantly more suggestible than female subjects.

4. A small group of psychopaths was found to be significantly less suggestible than the neurotic group.

5. The value of Hull's Body Sway test as a screening test for neuroticism is further confirmed by this study.

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THE KENT AND OTHER TESTS USED ON THE SAME SUBJECTS.

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TESTS of the indefinable quality known as intelligence are legion. Many have been standardized satisfactorily, others have not. The validity of some tests is high, but results of different tests used on the same individuals have seldom been published.

The Kent Emergency Test, although standardized on average American children, is, to quote its author, "framed expressly for adult subjects." Consequently, it can be used on children or adults. In this investigation it has been used on both. The Stanford-Binet was standardized on children and has been used on them only. The F.H.3 (or R) for adults has been used on adults only, and the Progressive Matrices, standardized by Raven on children and adults, has also been used on adults only.

MATERIAL.

In these investigations the subjects, to a total of 1,566, were examined as follows:

- (a) 557 subjects, each tested with the Kent and the Stanford-Binet tests.
- (b) 409 subjects, each tested with the Kent and Part I of the Farmer-Hotoph 3 (or R) given as a group test.
- (c) 600 subjects, each tested with the Kent and the Progressive Matrices given as a group test.

The Matrices tests were conducted by the Testers of the D.S.P. The F.H.3 (or R) tests were conducted by officers of the Army Education Corps. As regards the military cases, the Kent tests and many Matrices tests were performed by the writer.

Charts I and II show that the Kent, Binet and Matrices gave normal curves in populations (a) and (c).

RESULTS.

(a) *Kent Emergency and Stanford-Binet.* (Table VII.)

The Binet test and Earl's English modification of the Kent test (Rudolf) were given on the same day to each testee. Consequently, growth and temporary slight illness, e.g., headache, coryza, etc., would be unlikely to affect the results obtained on one test more than those obtained on the other. Both tests were given as individual tests, by the same tester, to all the testees. Both sexes were tested. The ages varied from $9\frac{5}{12}$ to 54 years, and the number examined was 557. All had been diagnosed as mental defectives before the tests were applied.

CHART I.

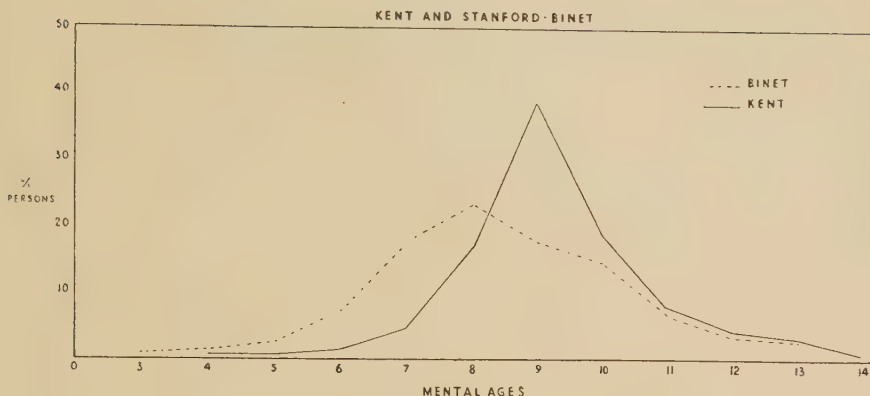
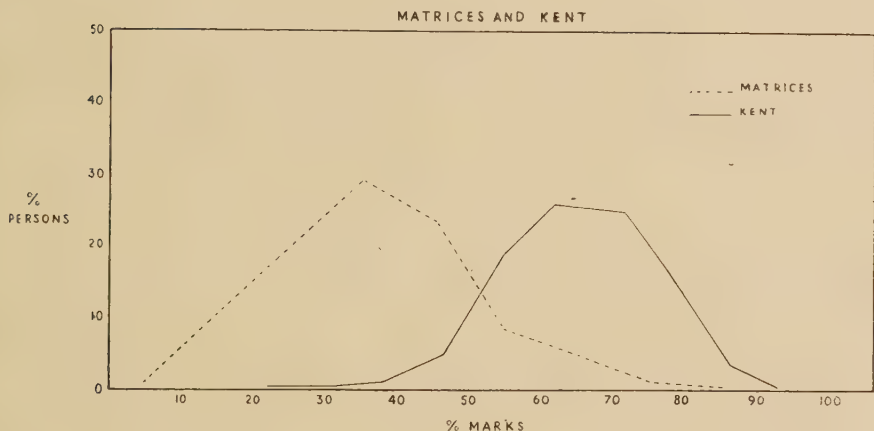


CHART II.



McIntyre and Hoffeditz compared the two tests on American feeble-minded individuals. The results of their investigations and of the present one on English subjects are shown in Table I.

TABLE I.—*Comparisons of Kent with Binet (Stanford).*

Number in series.	Chron. age (yrs.).	Mental age (Binet).	Mental age (Kent).	Mean Kent above mean Binet.	Kent > Binet %.	Kent = Binet %.	Kent < Binet %.	Author
(1) 161	5-30+	3-14	5-14	.81	.74	6	20	McIntyre and Hoffeditz
(2) 557	9½-54	3-16	5-14	.63	61.1	24.7	14.1	Present

This table shows that, in both investigations, the Kent records higher than the Stanford Revision in 60-75 per cent. of cases, but that in any individual it is impossible to foretell whether he will score higher or lower, as up to 1 in 5 may score lower on the Kent than on the Binet. The distribution of the cases is seen in Table VII.

(b) *Kent with F.H.3 (or R) Part I.* (Table VIII.)

The F.H.3 (or R) was given in groups, the Kent individually. Each subject was given the two tests, all the Kent tests being given by one tester. The subjects were adults of the male sex, a total of 409 being examined. The men were serving soldiers. The percentages obtained in Part I of the F.H.3 (or R) were compared with the percentages scored in the Kent Test. In the latter the percentages were calculated for the lower and middle scales on the maximum obtainable on the middle scale. Thus, the lower scale was regarded as a part of the middle scale. This is fair, since those of the lower intelligence are tested on the lower scale because they cannot reach the upper parts of the middle scale, and the marks for similar mental ages on the lower and middle scales are almost identical. With the upper scale the percentages were calculated on the maximum marks obtainable on this scale. The marks obtainable on this scale and on the middle scale are very dissimilar for identical mental ages. Table II shows the results obtained. Differences are considerable.

TABLE II.—*Marks Obtained by Same Testees on Kent and F.H.3 (or R).*

Subjects obtaining the marks.	Marks (per cent.) obtained—	
	On Kent.	On F.H.3 (or R).
169 . .	58-74	3-II

All, with the exception of one man, scored less than 35 per cent. on F.H.3 (or R) test, but only three men scored less than 34 per cent. on Kent's Scale.

(c) *Kent with Progressive Matrices.* (Table IX.)

The same subjects were tested with both tests. The Kent was given by one tester to all subjects, who were male adults only. The Matrices was given as a group test, and by numerous testers. A total of 600 men was tested. All were serving soldiers. The percentage marks obtained in the two tests were compared, the method of calculating those in Kent's test being as in the Kent-F.H.3 (R) (Table II).

The differences are less than is the case with the F.H.3 (or R) test as shown in Table III :

TABLE III.—*Marks Obtained by Same Testees on Kent and Matrices.*

Subjects obtaining the marks.	Marks (per cent.) obtained—	
	On Kent.	On Matrices.
229 .	66-81	11-61

DISCUSSION.

The results of these examinations show that individuals tend to score higher on Kent's test than on the Stanford-Binet, on Kent's than on F.H.3 (or R), and on Kent's than on the Progressive Matrices. As the same testees score differently on the tests, the tests may be testing different properties,

may be standardized incorrectly, or the allotting of marks may be on different principles. It is clear, however, that the Kent test gives higher results than the others, whatever the reason may be. (Table VII)

The giving of a test as a group or an individual test is of importance. This is especially so in the case of the Progressive Matrices, in which the marks for the individual test worked out on 660 children are lower than those for the group test, worked out on 1,407 children (Raven). The differences of the median scores of the group test and of the individual tests are shown in the following table, in each case the median for the group test being higher than that for the individual :

TABLE IV.—*Differences of Matrix Median (Group and Individual).*

C.A.	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½
Diff.	2	5	6	10	6	9	8	8	5	6	6	6

The difference between the 95 percentile points and the 5 percentile points respectively are shown in Table V in marks obtained in this test. Again, in each case, the differences are positive in favour of the group test, except at year 13 in the 95 percentiles, and at years 9½ and 10 in the 5 percentiles.

TABLE V.—*Differences of the Group and Individual Matrices.*

C.A.	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½
95 percentile	12	4	4	6	7	7	2	3	2	0	—1	0
5 percentile	0	1	0	—1	—1	0	1	2	1	3	1	3

In the lowest 5 per cent. of individuals from 8 to 11 years C.A., it is apparently immaterial whether the test is given as a group test, or individually. The same situation is true for the highest 5 per cent., with ages of from 12½ to 13½ years. The remaining differences fall between these two extremes of the lowest 5 per cent. of individuals at the lowest chronological ages and the highest 5 per cent. at the highest chronological ages.

If the mental ages are to be utilized for comparison with other tests, it is therefore necessary to know whether the test was given as a group, or as an individual test. Whatever the results given by a test, it is clear that the children themselves possess the same quantity of intelligence at the various C.A., although the same test, used differently, gives varying results. It follows that either the individual method, the group method, or even both methods, are inaccurate for recording intelligence alone.

The scores obtained on the Matrices Group Test have been placed by Raven in Grades (see Table VI), for adults.

For the purposes of comparison the use of the gradings (see Table VI) is unsatisfactory. A subject at the lower limit of one grade will be grouped in a grade different to that of a subject at the upper limit of the next lower grade, although separated by only one mark. A subject at the top of one grade may be as

TABLE VI.—*Matrices Grades (Raven).*

Grade I	55 and over
Grade II	49-54
Grade III plus	44-48
Grade III minus	29-43
Grade IV	24-28
Grade V	Up to 23

much as 23 marks from a subject at the bottom of the same grade, although both are grouped together. If the grade in which a subject falls is used, comparisons will therefore be unreliable.

As the mental ages read from the median differ according to whether the Matrices test is given as a group or as an individual test, there being up to $1\frac{1}{2}$ years' M.A. difference with the same median score, and as the same score can be recorded, in the individual test, on any mental age extending over a period of $1\frac{1}{2}$ years, e.g. 16 marks can give from 7 to $8\frac{1}{2}$ years' M.A., it is clear that the use of the mental ages for comparison is not reliable.

In consequence the marks obtained have been used. As pointed out by Raven, the standard series does not differentiate clearly between individuals within the groups.

The tests under consideration are so constructed that the so-called normal or average individual is unable to obtain full marks. The maximum mark obtainable in each test is not, however, the same. In the Kent test it is 42, 49 and 54 for the three scales, in the F.H.3 (R) test (Part I) it is 62, and in Raven's Matrices Test it is 60. In the comparison of the Kent Tests with the F.H.3 (R) or Raven's, it will therefore be necessary to determine how far the testee has been able to progress in each test. A simple plan is to calculate

TABLE VII.—*Kent and Stanford-Binet.*

	Binet M. A.													
Kent M.A.	3—	4—	5—	6—	7—	8—	9—	10—	11—	12—	13—	14	Kent totals.	
4—.	I												I	
5—.		I		I									2	
6—.		2	3	0	2	I							8	
7—.		2	3	13	9	2							29	
8—.			6	21	35	26	9	I					98	
9—.				6	52	81	49	25	7	I	I		222	
10—.				I	2	20	35	34	7	6	2		107	
11—.					I	2	7	17	11	6	2		46	
12—.						I	I	4	9	5	5		25	
13—.							I	4	4	3	4		16	
14 .									2		I		3	
Binet														
totals .	I	5	12	42	101	133	102	85	40	21	15	0	557	

the percentage of the total marks he has obtained and compare these percentages. This plan has therefore been followed. (Tables VIII, IX.)

TABLE VIII.—*Kent with F.H.3 (R).*

Kent percentage marks.	F.H.3 (R) Percentage marks.										Kent totals.
	1—	5—	9—	13	17—	21—	25—	29—	33—	35	
26—	1	1			1						3
34—	0	2	2		0						4
42—	9	8	6	1	0	2					26
50—	22	26	21	2	3	0	1				75
58—	36	44	34	4	3	5	1	2	1		130
66—	22	32	31	3	3	4	5	1	1		102
74—	9	12	20	5	2	4	1	2	4	1	60
82—	3		2	1		1		1	1		9
90											

F.H.3 (R)

totals	102	125	116	16	12	16	8	6	7	1	409
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TABLE IX.—*Kent with Group Matrices (all Cases).*

Kent percentage marks.	Matrices percentage marks.									Kent totals.
	I—	II—	2I—	3I—	4I—	5I—	—6I	7I—	8I	
18—	.	2								2
26—	.	0	I	2						3
34—	.	3	2	I	I	I				8
42—	.	I	8	9	10	5	I			34
50—	.	I	II	29	37	26	8	I	I	114
58—	.	I	20	34	50	39	10	4	I	160
66—	.	3	14	26	47	40	13	9	I	154
74—	.		7	13	22	32	15	7	5	101
82—	.			4	5	4	2	7	I	23
90	.				I					I

Matrices

totals	6	65	118	175	147	50	27	9	3	600
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Correlation coefficients have been kindly worked out by Prof. M. Greenwood from the tables. These are as below :

		Number of obs.			
Table VII	Kent and Stanford-Binet	557	+	0.7499	±0.019
„ VIII	Kent with F.H.3 (R) (group)	409	+	0.0893	±0.049
„ IX	Kent with Group Matrix (all cases)	600	+	0.2686	±0.038

The Kent and the Stanford-Binet tests show a fairly high correlation; the others, low.

CONCLUSIONS.

The Kent Emergency Test cannot be used as an alternative to the Stanford-Binet, the Progressive Matrices, or the F.H.3 (or R) test, as it does not record similar results on the same individuals.

In conclusion, especial thanks are due to Prof. M. Greenwood, F.R.S., for his advice and the calculations of the correlation co-efficients.

Thanks are due to Dr. J. Lyons, Medical Superintendent of Hortham Colony, Bristol, for permission to quote the cases from that colony.

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THE MANAGEMENT OF CHRONIC MENTAL PATIENTS.

By A. P. TAIT, M.B., Ch.B.

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MANY difficulties confront the medical officer who has in his care large numbers of mental patients. In the first place, owing to the staffing problems which beset the majority of mental hospitals in this country, he is probably overworked. He has neither the time nor the energy to deal adequately with the mass of work which confronts him, and as a result his output is often not as efficient as it could be. Further, when dealing with large numbers, a physiological factor enters which is often overlooked. It is very difficult to register and retain the many small variations in behaviour which are so important in the understanding of a patient, when perhaps 350 or more patients have to be seen every day. There seems to be a definite saturation point beyond which images are not retained; indeed we know that this is so, but we rarely seem to take account of it. The very sameness of deteriorated and apathetic patients contributes to this state of affairs.

From such considerations it will be obvious that in order to do his work efficiently as he can, the medical officer must not waste time. He must organize his work so that the time he spends with his patients is productive, for it is fatally easy to walk round a ward once or twice a day and achieve little, particularly with a good nursing staff in charge.

An analysis of this type of non-productive ward round led the writer to formulate an "aid" in an endeavour to overcome some of the difficulties and make his work more interesting and efficient. It was felt that it might be an advantage to have a record of behaviour covering the entire population of the ward, and which would give the reader an impression of how the ward had fared during the previous day. At the outset it was impossible to foresee practicability of such a procedure, but it was obvious that the attempt would be instructive, and at the worst, would provide an interesting experiment.

The "aid" would have to be simple, because it would be administered by an already hard-working nursing staff. It was adopted from Moore (1942), who used a series of numerical symbols to indicate levels of behaviour.

DESCRIPTION OF METHOD.

It was decided to record the amount of nursing required by each patient during the day. The grading adopted was as follows:

"0" = A clear day. One on which the patient required no nursing care of any kind.

" 1 " = Routine nursing care. Patient had to be led to the bathroom or put in his place for meals, or supervised while dressing or undressing.

" 2." = Routine nursing care plus special attention, not to the extent of—

" 3 " = More or less constant vigilance during the day.

" 4 " = Constant vigilance plus restriction from violence.

The numerical score was than completed by a symbol indicating within very broad limits the type of behaviour giving rise to it ; thus " * " indicated noisy, impulsive and/or hallucinated behaviour ; " + " destructiveness and " O " incontinence.

Finally, an indication of the treatment given was shown by a ☐ enclosing the score, which signified that an E.C.T. had been given ; a line beneath the score that a sedative had been given ; an ☐ enclosing the score indicated that the patient had had an epileptic fit.

Fig. 1 is a specimen of the record covering the period of four weeks. It will be seen that in the left-hand column the names of those patients appear who have scored *more* than 1 on some occasion during the four weeks. Those who constantly score 1 are shown as " Daily total of 1's " at the foot of the page. If any of these patients scored more than 1 on any day the name was then added to the list and he scored individually. If any patient scored a daily 1 for a period of four weeks his name was dropped from the list and he then figured in the bulk total.

In the ward in question there were no parole patients, and no patients sufficiently well to score 0.

The actual recording was done by the senior nurse on duty when he wrote up the ward books in the evening, and in order to assist him a small card was made out, giving the meaning of the various symbols, etc. ; though this rapidly became superfluous, it was useful for demonstration purposes.

In order to give an impression of the conditions under which the record was used, a brief description of the group and its surroundings will be given.

Owing to war-time evacuation from other hospitals, the ward in which the " aid " was tried out had at that time a fairly static population of 73 patients. The latter are accommodated during the day in a large, centrally heated day room which leads out into a covered verandah. This in turn leads to the ward garden. The verandah is shared with the other half of the house. Sleeping accommodation comprises one large dormitory on the first floor, divided into two unequal parts by a partition. Both upstairs and down there are a series of observation rooms for use in an emergency. There are no padded rooms. One of these rooms is adapted for giving E.C.T.

The patients comprise :

Schizophrenics	27
Mental defectives	23
Epileptics	8
G.P.I.'s	4
Senile dementia	10
Others	1

Names	January							February																			
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10
Barry, G.M.	2	3	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Gardner, W.	do	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Poland, J.	do	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Duncan, Jos.	Mental Def.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Johnston, Wm.	do	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Esple, J.	do	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Telfer, Wm.	do	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ross, R.J.	do	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Lockerbie, Wtr.	do	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Carmichael, R.	do	4	3	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Lightfoot, A.	Schizophrenia	1	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
McHallam, J.	do	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Dalglish, R.	do	2	2	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bruno, M.A.	G.P.I.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Palmer, A.	do	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Bennett, J.	do	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
McCrone, M.	Senile Dem.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Hoggan, W.	do	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Grant, P.	Paraphrenia.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Daily Total.		36	38	38	38	37	35	37	32	31	31	32	32	35	31	30	29	30	28	30	30	29	28	26	27	28	27
Weekly Total.							259							224					208								192
E.T.C. Daily Total.			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E.T.C. Weekly Total.							4						7						11								8
Number of 's.		54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54

FIG. 1.

Of these, 14 worked out of doors in a gardening squad; 12 are employed as ward workers; 18 are capable of doing occupational therapy; 29 are not capable of doing anything.

Approximately one-third of the total required more than routine nursing care.

All the defectives had signs of psychosis apart from their mental defect.

RESULTS.

After a period of seven months during which the record has been in operation, it is possible to make some general observations on the role it had played in the management of the ward.

(1) It became the habit to consult the record at the outset of the morning visit, which was then planned so that time could be spent on those patients who had required most attention.

One advantage of this planning was that the patients could be mustered in advance, and time was not wasted while nurses went in search of them. Usually the top scorers were already mustered before the doctor reached the ward. It is not denied that a similar procedure can operate well without the presence of any kind of record, but contrasting the ward under discussion with, for instance, the ward which occupied the other half of the house, there was a purposefulness about the morning round which was not attained in the "control" ward.

(2) From a therapeutic point of view the "aid" came to be used in the following ways:

(a) As an adjunct to clinical observation in determining the optimum time for E.C.T. in any given case, especially in those patients who were given "maintenance" treatment.

(b) As a means of estimating the response to treatment of any kind, and particularly the duration and type of response.

(3) It had the effect of transforming what tended to be "treatment in the mass" into treatment of the individual, an effort which was noticed in particular by the nursing staff.

(4) One result, not anticipated, was an apparent improvement in the general level of behaviour of the ward.

Realizing the difficulty of being objective in making an observation of this kind, the opportunity was taken of subjecting the results to statistical treatment, and it may be of interest to summarize the method used and the results obtained.

The numerical scores were restated in terms of "refractory units" (R.U.) one of these being defined as equivalent to "the attention of one nurse for one hour."

The values adopted were "1" = 1 R.U.; "2" = 4 R.U.; "3" = 9 R.U. No "4's" figured in the period under discussion.

The results are depicted in Fig. 2. It will be seen that the total refractoriness has fallen from 396 R.U.'s in November, 1946, to 289 R.U.'s in April, 1947, a difference which is significant.

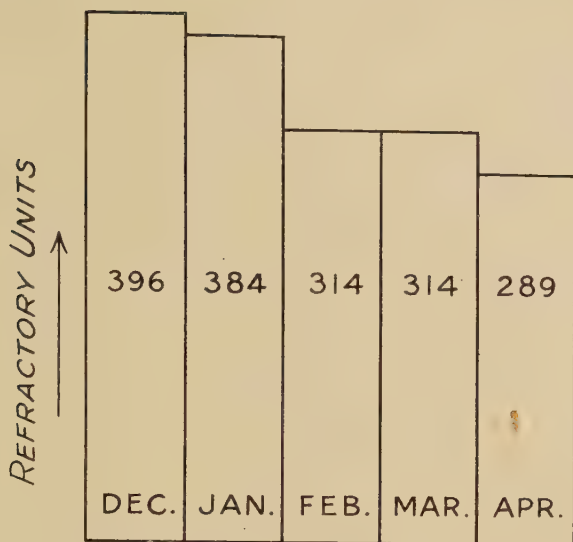


FIG. 2.

Thus the figures, providing that the mathematical assumptions are not very inaccurate, bear out the clinical observations.

DISCUSSION.

One of the criticisms which may be made about the chart is that the symbolism is too complex. In defence it can only be said that practice has shown this not to be the case. A more pertinent criticism would be that the symbolism was not complex enough; that to try to record behaviour in terms of five numbers and three signs is futile. It must be remembered, however, that the chart does not in fact record behaviour; it is basically a quantitative record concerned with nurses' time in relation to each patient, with some effort to show the qualitative nature of the behaviour absorbing the time. The real relationship to the behaviour of the patient lies in the fact that the more disturbed the patient, the more nursing he needs, and secondly, that the more nursing a patient needs the more likely he is to require treatment.

No attempt will be made to explore all the possible applications of "aid." Some have been touched upon, but the writer has made no attempt at systematic study of any particular group of patients and is therefore unable to assess the value or otherwise of the "aid" in such a study.

The purpose of the paper has been rather to place on record the work that has been done in the hope that some may find it of interest.

In conclusion it should be stated that during the period under review the additional work thrown on to the nursing staff was borne without protest—indeed the scheme aroused a good deal of interest and keenness.

SUMMARY.

A psychiatric "aid" in the form of a running record of the amount of nurses' time absorbed by each patient in a group of 73 is presented, and some of the results and applications discussed.

I am indebted to Dr. P. K. McCowan, Physician Superintendent of the Crichton Royal, for his permission to publish this paper, and to Dr. W. W. Roberts for his help in the statistical treatment of the results. My special thanks are due to Male Nurse B. A. MacFarlane for his keen and untiring co-operation.

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Part II.—Reviews.

Group Psychotherapy. By J. W. Klapman, M.D. London: William Heinemann, Ltd., 1946. Pp. viii + 344. Price 21s.

The body of this book is concerned with the practice of group psychotherapy in the mental hospital. It is made clear that the mental hospital should be transformed into a complex pedagogic establishment. Four forms should be created, with recent cases in the highest and deteriorated patients in the lowest form. Again, each form would be sub-divided into a number of classes. The curriculum is only given for Form A, and "downward revision" is suggested for other forms. The syllabus for Form A includes a course of 24 lectures in psychology and allied subjects; the reading of text-books; the reading of and debating on anonymous histories of members of the class. Records of class attendance should be kept; there should be progress reports at stated intervals and honours, and small prizes should be awarded.

As adjuncts, Moreno's method of psychodrama should be employed. Other ancillaries are the formation of social clubs; a hospital loud-speaker system, by means of which the superintendent can practice totalitarian group therapy; the creation of an institutional journal and a public relationship committee to educate the general public.

In the out-patient clinic and in private practice Schilder's biographical technique is thought most suitable. For problem children Glasson's modification of recreational therapy is preferred. The book starts with a historical survey, followed by an exposition of Freud's theory of group psychology.

STANLEY M. COLEMAN.

Deep Analysis: The Clinical Study of an Individual Case. By CHARLES BERG, M.D., D.P.M. London: George Allen & Unwin, Ltd., 1946. Pp. 262. Price 12s. 6d.

This book provides a detailed report of the analysis of an intelligent young man who came for analysis on account of emotional blunting and lack of drive, conflict over masturbation and lack of hetero-sexual interest. The analysis follows along orthodox lines. In the transference situation first a strong father-fixation is acted out; later, and at a deeper level, mother-fixation is unmasked. During the course of the analysis pre-genital mechanisms come to the surface. Of these the anal-erotic component is worth a brief notice.

A phase of negative transference had coincided with failure to meet the analyst's bills. It is then learnt that the analysis had absorbed not only the money put aside for this purpose, but also the current monthly saving as well. Later it emerges that the analysand has an inherited capital of £20,000, which he is loath to "cast into the melting pot." Analysis shows that in the unconscious this capital is identified with ego-rigidity, the interpretation being that "the proportion of his capital which he was prepared to put into the analysis was an index of the proportion of his personality that he was prepared to change. Hitherto the proportion had been zero." On this the patient asks: "Well, if I spent a thousand pounds of my capital what good would that do?" To which there is the laconic reply: "At a proportionate estimate I should say one-twentieth of the whole!" Though it is learnt that the analysis was carried to a successful conclusion, it is disappointing that we are not told what proportion of the ego-rigidity was ultimately made "fluid."

STANLEY M. COLEMAN.

War, Sadism and Pacifism. By EDWARD GLOVER, M.D. London: George Allen & Unwin, Ltd., 1947. Pp. 292. Price 9s. 6d.

This volume is an extended series of essays, the original having been published in 1933. There is little internal evidence to suggest that during the last 14 years' experience has caused the author to modify any of his basic principles. Briefly it can be said that the author's analytical experience has shown him that a man's attitude both to war and peace is based upon unreal fear and anxiety. These are the result of repressions and distortions, a legacy from the nursery. Applying these findings in individuals to international problems, it is believed that unconsciously motivated sadism and masochism are the essential causes of war and that economic factors, for instance, are partly or largely a "screen" for the real psychological causes. To prevent war it is advised that a large-scale research programme should be undertaken. This should be sponsored and financed by the State or UNO. Its purpose would be to search out and uncover the "irrational" causes of war and to point the best way to eliminate them for the future.

Supposing that all Dr. Glover has to tell us about individual reactions to war and peace is conceded, it has yet to be shown that this has any relation to, or even bearing upon, the causes of war. Save for organized human society, all the evidence points to the fact that throughout the animal kingdom when and wherever the economic cake is too small to go round, the result is behaviour of the "total war" pattern. Dr. Glover would have us believe that a sovereign state armed to the teeth and economically unsatisfied is not an object of rational apprehension to a neighbouring state. He tells us that there is no real enemy beyond the frontiers. It is merely that by projection we have externalized our own unconscious hate. It is advised that money now spent on the re-organization of state defence should be handed over to the psychoanalyst, who would then reorganize the nursery, the real source of the trouble.

The reviewer likes to imagine Dr. Glover explaining to the Stegosaurus facing a flesh-eating Tyrannosaurus, that such heavy armament is an uneconomical outlay, since his fears are due to irrational causes and that what is really needed is a thorough overhaul of the nursery life of the Dinosaurs. As Emery Reves has made abundantly clear, where human law is absent jungle law prevails. Between sovereign states there is no human law.

It is to be presumed that Dr. Glover has got so used to standing on his psychological head in his attempts to find irrational causes for his patients' disorders that finally this acrobatic feat has become his normal posture. From such an angle a starving man who stole a loaf of bread could be regarded as a case of kleptomania.

STANLEY M. COLEMAN.

Ego, Hunger and Aggression: A Revision of Freud's Theory and Method. By F. S. PERLS, M.D. London: George Allen & Unwin, Ltd., 1947. Pp. 274. Price 12s. 6d.

This interesting book is in part a criticism of psycho-analysis, and in part an attempt to put forward a new theory of psychological disorder and a new approach in psychotherapeutic technique.

The author agrees with Freud that in psychogenic diseases the symptom has a meaning, that there is a disturbance of development and adjustment, that the instincts, emotions and the unconscious play a much more important part than reason, and that these disorders are the outcome of a conflict between organism and environment. On the other hand, he thinks that Freud overestimated the importance of causality, the past and sex instincts, and neglected the importance of purposiveness, the present and the hunger instinct. From the point of view of technique he believes there is too much analysis, free-association and "dis-centration" away from the symptoms. He further criticizes the nearly obsessional religious ritual of the analytical session.

The author is indebted to a number of sources for his critical attitude. First there is Friedlander's dialectical philosophy of "creative indifference." Psycho-analytical concepts are constantly reviewed from this angle. For instance, he finds that love and hatred are proper opposites, but sex and death instincts are incorrect poles. The influence of Bergson is shown by the importance attached to the present situation and final causes, as against the analysts' concentration on the past. The influence of Gestalt psychology and Smuts' "holistic" conception are also conspicuous. In the author's opinion Freud tends to treat psychological facts as if isolated from the organism.

Dr. Perls' main criticism is directed against the conception of an aggressive instinct. It is his belief that there is no such energy as aggression, which is a biological function, and "in our time has turned into an instrument of collective insanity." From here there is an examination of the hunger instinct, which is found to be quite separate from the sex instinct. He finds that the destructive tendency is a very powerful instrument of the hunger instinct, which should have its natural outlet in the use of the teeth. If this tendency remains ungratified, it may evince itself in such harmful ways as killing, waging war, cruelty, or by means of "retroflexion," as self-torture or even self-destruction. It is held that the use of the teeth is the foremost biological representation of aggression. Projection, repression of (or the resistance to) aggressive functions may result in such character anomalies as the melancholic and the paranoid, and are also largely responsible for the "deplorable state of our civilization."

The last section of the book is devoted to a series of exercises in concentration therapy. From the above it is not surprising to find that the first exercise is devoted to chewing.

The reader will find much that is stimulating and thought-provoking in this book. He will also find much that he is quite unable to accept. For instance it is surprising to learn that Freud "neglected the importance of purposiveness." Despite his exercises in chewing it is to be noted that Dr. Perls still has a healthy reserve of aggression. This comes prominently into play when he is dealing with those of a different political complexion.

S. M. COLEMAN.

Psychopathology : A Survey of Modern Approaches. By J. ERNEST NICOLE, *O.B.E.*, *L.M.S.S.A.*, *D.P.M.* Fourth edition. London : Bailière, Tindall & Cox, 1946. Pp. viii + 268. Price 15s.

A further edition of this standard work on psychopathology requires only a brief notice here. It is a popular favourite, and provides a lucid introduction to all the main schools of thought upon the subject. In this edition there have been only minor alterations and additions.

S. M. COLEMAN.

The Psycho-analytical Approach to Juvenile Delinquency. By KATE FRIEDLANDER, *M.D.*, *D.P.M.* London : Kegan Paul, Trench, Trübner & Co., Ltd., 1947. Pp. viii + 296. Price 18s.

The book is divided into three sections, preceded by a few introductory chapters on the psychiatric, psycho-analytical and sociological approaches to juvenile delinquency. The first section is theoretical, and is concerned with the development of the child towards social adaptation. It is a clear and adequate representation of orthodox Freudian theory. The second section provides clinical descriptions of the various types of delinquent. There are a number of case-studies, a few being reported in great detail.

In the section on treatment stress is laid on the importance of an early and thorough diagnostic examination by psychiatrist, psychologist and social worker. Psychological methods of treatment include psycho-analysis and

other forms of psychotherapy. Environmental methods should be combined with psychological treatment. In many cases much can be done by re-education of the parents. In those cases where delinquent behaviour is due to an antisocial character formation and where the home background is beyond repair a foster home is the first choice. If this is impossible, institutional treatment will be necessary. The author thinks that small establishments have many advantages over the big institutions. For the prevention of crime the economic conditions of the homes should be improved, parents should be better educated on the bringing up of children and maladjusted parents should be treated.

Psychoanalysis is founded on the pleasure-pain principle, and it is therefore surprising to find that punishment, the orthodox method of training towards social adaptation, is hardly referred to. Surely a critical and statistical appreciation should be a central feature. Here a few isolated incidents are cited where punishment has been unsuitable or discipline too severe. Again all we are told as to the value of punishment is that a subjective motive, namely unconscious guilt, which finds relief in the punishment of the criminal, is to be imputed to the public.

S. M. COLEMAN.

The Psychology of the Unwanted Child. By AGATHA H. BOWLEY, Ph.D. Edinburgh: E. & S. Livingstone, Ltd., 1947. Pp. xii + 112. Price 6s.

This well-written and informative little book should be of real value to matrons, wardens, and all those people who are responsible for the care of children removed from their homes. Such children include the homeless, the unwanted, the rejected and the uprooted child. It is stressed that healthy roots are essential for healthy personality development. Where the roots are not healthy it may be possible to improve or readjust the home and school conditions. If this cannot be done advice is given on the adjustment both of child and environment in a substitute home or institution. A main purpose is to hasten the fulfilment of many of the recommendations of the Curtis Committee Report.

S. M. COLEMAN.

Men Under Stress. By R. R. GRINKER and J. P. SPIEGEL. London: J. & A. Churchill, Ltd., 1945. Pp. xii + 484. Price 25s.

This most excellent book is devoted to a consideration of the psychological problems of United States Air Force personnel, i. e. flying personnel. The work is divided into two sections, the first dealing with war neuroses appearing overseas, and the other with men returned home for relief from flying or rehabilitation. A small section is added on the application to civilian psychiatry and on general social implications.

There are 65 illustrative case-histories, the cases being described in considerable detail and the treatment of each case given.

Although the book as a whole is very well done, there is a great deal of unnecessary matter. There are about 180,000 words in the book—this could be very greatly reduced without in any way detracting from its great merit.

G. W. T. H. FLEMING.

Mental Health. By J. H. EWEN, F.R.C.P.E. London: Edward Arnold & Co., 1947. Pp. 270. Price 12s. 6d.

This small book the author states "represents an attempt to give a concise account of the salient features of mental illness as a whole and to depict this branch of medicine in as simple and practical a manner as possible."

The author has succeeded very well indeed in what he set out to do, and we know of no better "concise account" of mental illness.

"Particular attention has been given to the requirements of students who may be studying for a Diploma in Psychological Medicine." Having regard to present-day requirements for the D.P.M., we doubt if there is enough in this small book to "satisfy the examiners"; the standard of the D.P.M. is very much higher to-day than it was ten years ago.

It is an enjoyable book to read and we think most useful for students and practitioners. The book is well produced, and in every way a credit to British Psychiatry.

G. W. T. H. FLEMING.

A Handbook of Psychiatry. By L. J. KARNOSH, M.D., and E. M. ZUCKER, M.D. London: Henry Kimpton, 1945. Pp. 302, with 40 illustrations. Price 25s.

This small book is offered to the general practitioner. It presents psychiatry from the standpoint of the American school, looking on mental illness as a reaction to various psychologic and biologic forces.

Is it necessary in the glossary to tell general practitioners that psychiatry is the "study and treatment of mental disease," or that coma is "a profound stupor from which the patient is aroused with great difficulty?"

We think it unwise to stipulate that "as a rule psychoneurotic individuals do not develop a psychosis, and the common lay notion that nervousness is usually a forerunner of mental disease is not based on clinical experience." Neurotics often do develop psychoses. What *does* the author mean by nervousness? He does not define it in his glossary! Surely in these modern days both terms neurasthenia and psychasthenia have been discarded. Reactive depression, a condition of depressed mood, where the situation is so distressing that it is naturally productive of dejection, sounds to us like a perfectly plain psychosis and *not* a neurosis.

G. W. T. H. FLEMING.

Agnosia, Apraxia, Aphasia. Their Value in Cerebral Localization. By J. M. NIELSEN, M.D. Second edition. New York: Paul B. Hoeber, 1940. Pp. 304, with 59 illustrations. Price £1.

The second edition of this book, which first appeared in 1936, is a great advance, but it is only for those who have an extensive knowledge of neurology and of neuroanatomy. To these rather eclectic readers the book will be a sheer joy, for it is very well written and extremely well produced and illustrated, and not, as is so distressingly common nowadays, "in keeping with regulations for conserving paper and other essential materials."

The author gives a brief account of the historical development of his subject, and then outlines his concept of eugnosia, eupraxia and euphasia, the disturbance of which yields agnosia, apraxia and aphasia. The agnosias he divides into visual and acoustic varieties, the apraxias into kinetic, ideokinetic and ideational types, and the aphasias into those of higher and lower levels. The former contains the semantic aphasia of Head, while the latter contains motor and sensory aphasia.

He gives a brief but most useful chapter on methods of examination, short enough to be used as a routine in clinical examination. In an appendix he gives a very good summary and a glossary of terms.

To anyone who is prepared to work steadily through the book and familiarize himself with the terminology there is a great deal to be gained.

G. W. T. H. FLEMING.

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Clinical and EEG Investigation of Prefrontal Lobotomy Patients.

1. A follow-up study of 30 cases of prefrontal lobotomy was done. Twenty-three of these patients were operated on after admission to St. Elizabeth's Hospital after a prolonged incapacitating illness. Of these 23, 21 were benefited by the operation, 11 were considered social recoveries, and 9 were discharged from the hospital. An organic syndrome was substituted for the psychosis. Restitution of the patient's pre-psychotic state should not be expected. One patient was made worse.

2. Protracted illness did not militate against improvement in these selected cases.

3. The criteria employed for the selection of these cases for psycho-surgery are justified by the high percentage of patients that were benefited.

4. No objective neurological signs resulted from the operation.

5. Post-operative convulsions occurred in 10 out of 30 cases.

6. Electroencephalograms of 23 out of 24 cases showed definite abnormalities.

7. There is no correlation between EEG pattern and post-lobotomy improvement. (Authors' abstr.)

The Effect of Bilateral Frontal Lobotomy upon the Autonomic Nervous System.

1. Cortical representations of the autonomic nervous system are located in the prefrontal area.

2. Following the subcortical section of the frontal lobes, the autonomic nervous system becomes more responsive to stimuli from without.

3. Equilibrium re-established itself on a different level.

4. With the disconnection of the frontal lobe, excitatory and inhibitory influences upon the A.N.S. are abolished, which may explain certain clinical observations such as the fall in blood-pressure in hypertensive patients.

5. Frontal lobotomy which, at present, is performed for the surgical treatment of serious mental illnesses, may, in the future, become a method for the treatment of selected cases of hypertension. (Authors' abstr.)

The Effects of Electric Convulsive Therapy on Certain Personality Traits in Psychiatric Patients.

In contrast to the Minnesota and other personality questionnaires which were not helpful as diagnostic or prognostic aids, the perceptanalytic test of Rorschach was a valuable prognostic and diagnostic aid. The Rorschach findings paralleled the personality changes observed clinically. Even before treatment there was a significant difference between the Rorschach records of improved and unimproved schizophrenics treated with ECT.

The improvement after shock therapy seemed to depend on two different factors. One condition for improvement was the presence of only mild or no intellectual regression. In other words, the patient's intellect should not be markedly affected by the psychosis. The other condition was that there be a marked discrepancy between the potential and the actual level of the schizophrenic's mental or psychological functioning. The greater this discrepancy, the greater the improvement seemed to be, other conditions being equal.

According to the Rorschach findings, the discrepancy between the potential and actual mental functioning was apparently correlated with the schizophrenic's anxiety endangered by his awareness of the personality changes which had taken place as a result of the psychosis. To use simple language, many schizophrenics "exaggerate" the effect of the psychosis upon their personalities. They become unduly anxious and withdrawn in an apparent attempt to minimize the chances of maladjustment and conflict with the environment. Some become anxious and agitated, as if trying to escape painful insight into their personality deficiencies by means of a vigorous and usually sudden increase in motor activity. The patients seem so preoccupied with their anxiety and what might be termed their attempts to cure themselves of the anxiety that they neglect to function as well as they could in objective reality and in social relationship. If anxiety and depression are secondary results of the psychosis, then successful shock therapy removes these secondary effects of schizophrenia. According to available Rorschach evidence, schizophrenics whose actual psychological performance level is near their potential level do not improve even when these patients show very few, or no primary intellectual deficiencies caused by the psychosis.

The following personality changes have been observed in schizophrenics by means of the Rorschach method after a successful treatment: the patients became much more concise; they were less circumstantial; the logical coherence of their reasoning was improved. There was usually a definite improvement in the capacity for consciously directed and prolonged voluntary attention. They showed more control in thought and action. They were emotionally calmer and less sensitive. At the same time they appeared emotionally duller. These results probably can be explained fully by a decrease of emotional pressure. The decrease in anxiety and depression reacted favourably upon intellectual functioning. Thus, although there seemed to be no real improvement in intellectual capacity, the improvement in intellectual efficiency was very noticeable. The decrease in anxiety through successful treatment resulted in a lesser stimulation of imagination, and thus revealed more clearly the emotional impoverishment of the schizophrenic.

Finally, as far as the perceptanalytic test of Rorschach is concerned, there seemed to be no difference in its prognostic value whether used in insulin coma treatment or in ECT. (Authors' abstr.)

Effects of Cerebral Electroshock on Experimental Neuroses in Cats.

Six cats were made experimentally neurotic, and were then subjected to cerebral electroshocks comparable to those used in clinical therapy. All of these animals showed a marked disintegration of inhibitions, phobias, compulsions and other neurotic patterns, with emergence of simpler, more normally readaptive behaviour,

which could be further improved by guidance, retraining, and other corrective procedures. However, all of the neurotic animals and two normal controls subjected to the electroshocks also showed an impaired capacity for complex adaptations, with subsequent recovery in only two of the animals. In no case, however, could these deficits be correlated with corresponding histopathologic changes in the brain. The significance of these observations in relation to the clinical use of shock therapy is briefly discussed. (Authors' abstr.)

Electroshock Therapy. A Review of over 23,000 Treatments using Unidirectional Currents.

1. Forty per cent. of the most chronic patients showed significant improvement in ward behaviour if adequately and repeatedly treated with suitable type of electroshock therapy. Relapses must be treated whenever they occur over months and years.

2. At least 60 per cent. of early cases, aged 60 or under, were rehabilitated within one year when adequately treated, and 65 per cent. by the end of the second year after the start of treatment.

3. Adequate treatment means intensive treatment until the expected improvement has occurred, and intensive treatment of relapses when they occur. No patient, otherwise suitable who is still not rehabilitated after one year, has had an adequate trial of treatment with less than 20 treatments.

4. An ideal therapy is one which achieves beneficial results without causing accumulating brain damage, thus permitting its use repeatedly for years if necessary.

5. This ideal is approached by the relatively low intensity 60-cycle pulsating direct current used in the treatment of the patients reviewed in this paper. This technique also has been accompanied by an exceptionally low percentage of skeletal complications. (Author's abstr.)

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The Advantages of Nitrous Oxide Inhalation in Psychiatric Treatment.

1. Previously described methods of inhalation anaesthesia and hypoxia in psychiatric conditions have been reviewed.

2. A technique of nitrous oxide administration beyond the state of intoxication and avoiding the stage of deep hypoxemia has been described.

3. Physiological changes with this form of anaesthesia are slight and the method may be considered safe.

4. After the anaesthesia, a period of facilitation of mental processes is observed, which is followed by a period of relaxation and sedation.

5. During the phase of facilitation the patient has a feeling of increased well-being, and shows greater spontaneity, less resistance, and enhanced insight, often expressing previously repressed ideational content and affects.

6. The period of sedation lasts for several hours, and is not associated with drowsiness or confusion. Sleep is usually improved the following night and other sedation is often unnecessary.

7. In states of acute manic excitement, repeated daily administration of nitrous oxide has controlled and terminated the attack in some cases.

8. Nitrous oxide hypoxia produces some of the features of the "shock treatments" as well as of narcoanalysis, but it is safe, convenient, and simple in admini-

stration, and may be used in ambulatory patients without interruption of their ordinary activities.

9. The theories on the pharmacological action of nitrous oxide and the reason for its choice are discussed. (Authors' abstr.)

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Psychopharmacologic Study of Schizophrenia and Depressions.

From these data it would appear that the lactic and the pyruvic acid contents of venous blood and their ratio do not differ significantly for patients with either depression or schizophrenia from the values for normal controls under basal conditions. The data, furthermore, suggest that the intravenous administration of sodium amylal in a dosage of 250 mg. is not sufficient to change significantly any of these values. This experimental approach does not assist, therefore in the elucidation of the differential response of the two groups of patients to this drug.

Although there is no essential difference in the general condition of the oxidative reactions as so determined among the two groups of patients and the normal controls, the possibility of other metabolic disturbances is not eliminated. The data simply suggest that general metabolic disturbances may be sought either before or after the pyruvate: lactate phase in the carbohydrate oxidation-reduction system. Neither is the possibility of more specific metabolic disturbances in the central nervous system eliminated. For such studies, blood should be obtained from both the carotid artery and the jugular vein.

The values for the lactic acid of the blood here reported are lower than those recorded elsewhere in the literature, probably as the result both of the method used and of the basal state of the subjects. (Authors' abstr.)

The Electroencephalogram in Encephalitis.

The electroencephalograms in 240 cases of encephalitis were studied in various stages of the disease. It was found that abnormality is often focal, and that it correlates with the stage of the disease. During the acute and subacute phases it correlates with the general severity of symptoms. However, the only feature of the postencephalitic syndrome which correlates highly with electroencephalographic abnormality is the presence of convulsions.

The electroencephalogram has diagnostic value for encephalitis, and after the acute phase is past it has prognostic value for postencephalitic epilepsy.

Wave and spike activity of the *petit mal* type is a common sequel of encephalitis in children. (Authors' abstr.)

Effect of Electrically Induced Convulsions on Peripheral Venous Pressure in Man.

Electrically induced convulsions cause marked transitory elevations in venous pressure consequent to muscular straining, the Valsalva phenomenon, increased carbon dioxide tension of the blood and possibly also increased circulating epinephrine. After termination of the seizure the venous pressure remains slightly

elevated. It is concluded that the pronounced increases in venous pressure are of such short duration as to create little hazard of inducing intracerebral capillary haemorrhages. That other hazards exist is, however, recognized. It is concluded that the marked rise in venous pressure and the circulatory changes associated with it are not essential to obtaining clinical improvement. (Authors' abstr.)

Psychosis During Withdrawal of Morphine.

While it appears that withdrawal of morphine is not sufficient in itself to cause a psychosis, it is apparent that it may intensify the symptoms of a psychosis that already exists; this was demonstrated by the patients who had a psychosis prior to withdrawal. It is interesting that in the case of a schizophrenic addict who had withdrawal of morphine alone, the increased vividness of the delusions and hallucinations together with the disorientation resulted in the picture of a toxic psychosis.

It is of course impossible to know how much the withdrawal of morphine contributed to the picture of the toxic psychosis apparently produced by alcoholism and barbiturates; there is little doubt that at least anxiety was increased.

In view of the fact that so large a percentage of persons with addiction to morphine have severe neurotic traits, it is curious that more do not become psychotic during withdrawal of the drug. The withdrawal of morphine, even with the best medical care, is a rigorous anxiety-producing experience. These facts perhaps lend support to the thesis that the psychoneuroses and the psychoses are not a continuum, but, rather, are distinct entities. The development of delirium in the first schizophrenic addict suggests a close relation between schizophrenia and toxic psychosis.

The findings in this study indicate that withdrawal of morphine, of itself, is rarely, if ever, a cause of psychosis. In each instance complicating factors (schizophrenia and various types of organic psychoses) accounted for the psychosis during withdrawal. It must be noted that rapid withdrawal (10 days) is the method usually employed, and that with quicker withdrawal more instances of psychoses would perhaps have occurred. Yet Himmelsbach and Williams found, during the abrupt withdrawal of morphine from 400 addicts under close supervision so that no other drugs could be used, only one patient who became obviously psychotic. (Author's abstr.)

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Physiology and Therapy of Convulsive Disorders: (1) Effect of Anticonvulsant Drugs on Electroshock Seizures in Man.

Data are presented on the ability of anticonvulsant agents to prevent tonic-clonic seizures in non-epileptic patients undergoing electroshock therapy.

Diphenylhydantoin in non-toxic doses consistently abolishes the tonic phase of electroshock seizures. "Mesantoin" (N-methyl, 5-phenyl, 5-ethyl hydantoin) also ranks high in ability to modify the pattern of convulsions. Phenobarbital, sodium bromide and "mebaral" (N-methyl, 5-phenyl, 5-ethyl barbituric acid) are effective, but only in doses which occasionally produce undesirable side effects. "Tridione" (trimethadione) is ineffective in modifying the electroshock seizure pattern when given in doses more than adequate to control clinical *petit mal* epilepsy.

It is suggested that the modification of the electroshock seizure pattern in man offers a convenient method for the evaluation of potentially useful anticonvulsant drugs. (Authors' abstr.)

Influence of Anxiety on Attention, Learning, Retention and Thinking.

A group of tests were selected for the study of active and passive attention, learning, retention, immediate memory and thinking. The reliability was established in all tests which were used in this study.

Anxiety appears to decrease active attention, as measured by the longest span of digits before an error is made. Passive attention as studied by the recall of the number of units of the "Barn Story" was affected adversely by intense anxiety. The effect was less clear when anxiety was not intense. Learning on the maze test was reliably slower in the presence of anxiety. Retention ability, tested by repetition of the maze test 24 hours after it was learned, was affected unfavorably by anxiety. Thinking was studied by means of the Kohs Block Test. It seems that anxiety decreases the score significantly with most patients, but there is a small group which is influenced little. The influence of anxiety in the different experiments was not uniform. It may happen that one or the other of the aforementioned functions is affected little, whereas all or the majority of the remaining functions are affected to a pronounced degree.

The possible influence of anxiety on the various functions which are tested in the current type of psychiatric examination has to be considered more seriously than has been done heretofore. It may be possible to gauge the intensity of anxiety from the findings. It is necessary, however, that the technic of the examination be refined by a careful scoring of the "Cowboy Story" test, and by the inclusion of additional tests which have been found useful and reliable in psychologic study.

(Authors' abstr.)

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Penicillin in Treatment of Neurosyphilis.

Criteria for evaluation of therapeutic success in neurosyphilis are discussed.

One hundred and fifty-one patients with active neurosyphilis were treated exclusively with intramuscular injections of penicillin every 3 hours, the dose and the length of therapy being varied.

One hundred and thirty-five patients (90 per cent.) responded satisfactorily; 100 of these were followed for 12 months or more. The longest period of observation was 28 months.

The optimum dose of penicillin is yet to be established, but the authors' experience has led them to adopt a schedule of 40,000 units injected intramuscularly every 3 hours for 150 doses, a total of 6,000,000 units. (Authors' abstr.)

The Electroencephalogram in Poliomyelitis.

1. No definite or consistent electroencephalographic changes which might indicate abnormal electrocortical activity were observed prior to the onset of fever or paralysis in monkeys given intracerebral injections of either the RMV or the Aycock strain of simian poliomyelitis virus. Abnormalities in the electroencephalogram appeared during the paralytic stage and became more conspicuous with the progression of symptoms. The electroencephalographic changes consisted chiefly in a progressive increase of slow activity, disappearance of alpha rhythm, a relative increase in the amount of fast activity and a lowered voltage output.

2. No electroencephalographic abnormalities were noted in guinea-pigs given either intracerebral or peripheral injections of murine poliomyelitis virus in the presence or absence of paralytic symptoms.

3. Of 17 patients convalescent from poliomyelitis, all of whom had severe residual paralysis, 2 exhibited definite electroencephalographic abnormality and 5 showed a borderline disturbance. The remaining 10 patients had normal electroencephalograms. (Author's abstr.)

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The Psychiatric Manifestations of Temporal Lobe Lesions.

1. Mental aberrations are of common occurrence in cases of tumour of the temporal lobe. They include changes in personality, disturbances in affect, disturbances in intellectual and higher psychic functions, and hallucinations of vision, hearing, taste, and smell.

2. Certain of these psychic changes are identical, and it would seem indistinguishable from those seen in frontal lobe disease. Apparently the so-called "prefrontal lobe syndrome" is common to both temporal lobe tumours and tumours of the frontal lobe, but is presumed to be more specific for the frontal lobe group.

3. There is some evidence suggesting that the type of clinical picture which develops concurrently with brain tumour is influenced by the premorbid personality of the patient regardless of the site of the lesion.

4. It seems clear that a regional diagnosis of temporal lobe tumour cannot be made from the presence of psychic disturbances alone, but if an intracranial tumour is known to exist from other clinical data, neurologic and otherwise, the concomitant mental changes may be of some value in localizing it.

5. Mental symptoms following ablation of the right temporal lobe are relatively unimportant, and seem confined to a reduction in drive, some slowing of the mental tempo, and minor disturbances in memory. Therefore, one must conclude that the effects of irritation are much different from the effects of ablation.

6. It has been rather conclusively demonstrated that intracranial hyper-tension itself does not produce a qualitative change in the psyche. Torpor should be considered only as a quantitative impairment of consciousness and should be excluded.

7. Symptoms of right temporal lobe disease center about the functions of vision, hearing, taste, and smell. Hallucinatory phenomena arise out of excitation of these centres, and are sometimes accompanied by peculiar and rather distinctive dream-like states.

8. Visual hallucinations are commonly reported to occur with tumours of the temporal lobe, being characteristically observed in the field of vision contralateral to the tumour, or, when hemianopia is present, in the blind field. These hallucinations tend to be of the complex, highly-organized type in contradistinction to the simple unformed hallucinatory phenomena reported in cases of occipital lobe tumour.

9. Auditory hallucinations are likewise seen in cases of temporal lobe tumour, and are reported as being of complex, highly-organized character.

10. Hallucinations of vision and hearing occurring with temporal lobe tumours are usually accompanied by insight as to their real nature on the part of the patient.

11. In patients who have hallucinations of taste and smell and who prove to have organic intracranial disease the lesion is said invariably to be situated in the temporal lobes.

12. Much of the confusion over the significance of mental changes in temporal lobe lesions stems from the lack of complete premorbid, morbid, and post-operative psychiatric study by a psychiatrist, of patients suspected of having brain tumour.

(Author's abstr.)

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Experimental Catalepsy in the Rat Produced by a Steroid Hormone.

Desoxycorticosterone acetate injected intraperitoneally in large doses in immature female white rats produces a state of experimental catalepsy. This may be observed to occur either alone or in association with deep anaesthesia. In the latter case the catalepsy precedes and follows the period of anaesthesia. The intraperitoneal injection of pentamethylenetetrazol (metrazol) antagonizes the cataleptic effect of the steroid hormone. (Author's abstr.)

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A Continuation Study of Anxiety Reactions in Young Children by Means of a Projective Technique.

In summary, one may conclude that the data have yielded several significant findings.

The investigation has shown (a) that the equivocal pictures have definite value in discriminating between the child with a low anxiety score and the child with a high anxiety rating; (b) that a group of unselected normal children tend to associate anxiety, with a high degree of frequency, with certain specific areas of experience, especially with the field of child-child relationships, and that even though anxiety in this area decreases over a period of months, it is still the area of greatest anxiety for the majority of the children studied. (c) That the test is a good instrument for measuring anxiety is shown by the Rho for the odd-even split half correlation, which was .95. (d) Rho for the retest correlation, .22, shows that the test is sensitive to the changes that have occurred in the child's thinking and feeling. The correlation coefficient of .44 for the older children, between test and retest, indicates a measure of reliability which is greater than is at first apparent, when one remembers that a projective test, to be of value, must indicate significant changes in individual thinking and feeling, when they occur. (e) The correlation of .59 between test results and teacher ratings shows that there is positive relationship between test results and behavioral patterns.

(Authors' abstr.)

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- *Maze Test Validation and Psychosurgery. *Porteus, S. D., and Peters, H. N.* . . 3

Maze Test Validation and Psychosurgery.

1. Taking all 55 patients together there is a decided and significant decline in Maze Test performance after lobotomy.

2. The decline is most marked if the first post-operative examination is given within one month of lobotomy, is somewhat less marked if 1 to 1½ months has elapsed, and is considerably less if the interval is longer than 1½ months. These tendencies to relatively smaller declines with time are apparently associated with improved planfulness. Practice effects are, however, greatly reduced in comparison with what happens in normal cases.

3. When the patients are divided into three groups on the basis of improved social adjustment and the Maze is repeatedly applied the two improved groups, though suffering the greatest initial decline, make larger subsequent gains than the unimproved group. The much improved patients finally excel the middle group. These statements relate to averages of performance.

4. When the number of applications of the test is disregarded and scores tabulated for stated intervals there is, except at one point, a steady rise in test age on successive applications, but not until the sixth testing does the average rise above the prelobotomy level.

5. After operation, patients have a greater tendency to repeat errors in successive trials in the Maze. The greatly improved group have again the best record when all post-operative performances are summated. If only the third, fourth and fifth applications of the Test are combined the difference in favour of the improved groups is still more striking.

6. What are called "shatter" effects are more characteristic of the unimproved group than of the other two groups of improved patients.

7. The improvement in qualitative performance in the Maze is most marked for the greatly improved group.

The conclusion seems inescapable that the Maze Test is very significantly sensitive to changes in intelligence following lobotomy. The correspondence

between clinical observations and test performance also indicates clearly that recovery of planfulness is reflected in successive Maze Test applications.

Perhaps a final disclaimer should be made. In spite of the fact that the Porteus Maze has in the authors' opinion met all the validating criteria set up as the result of lobotomy, that is not the main lesson of this study. To their minds it is the conclusion that whether or not we consider planning and foresight essential to any description of intelligent behaviour, the effects of lobotomy demonstrate clearly that these traits are essential to social adaptation. Whether the Maze is adequate for carrying such an important diagnostic burden is another question.

Twenty-five years ago Yerkes remarked to the senior author of this monograph : " If psychologists would only pay less attention to Binet-measured functions and devote a more reasonable share of their efforts towards developing tests of other socially essential traits, the whole problem of objective testing would be much nearer satisfactory solution." That statement is true to-day. Development of better tests of planning, foresight and initiative than the Maze is one of the urgent tasks that face clinical psychologists in the future. Psychosurgery offers a unique opportunity to validate these forthcoming tests. Unfortunately, planning and foresight do not seem to be among the conspicuous qualities of psychologists ; otherwise, such a diagnostic responsibility would not have been necessary to impose on a single test scale. (Authors' abstr.)

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An Experimental Study of the Effects of Sodium Amytal Upon Performance on the Hunt-Minnesota Test for Organic Brain Damage.

A significant difference was not established between the mean score of deterioration sensitive tests given to 40 student nurses after hypodermic administration of one and one-half grains of sodium amytal and that from tests of the same girls given without the drug. For the 40 cases the critical ratio was 0.84. In other words, the results of this study seem to indicate that sodium amytal when given subcutaneously in small sedative amounts probably does not have a clinically significant effect upon mental efficiency. Since sodium amytal is a representative barbiturate, it seems likely that the barbiturates do not interfere to an appreciable extent with intellectual capacity unless the patient shows clearly discernible signs of sedation. (Author's abstr.)

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A New Method of Measuring Emotional Stability.

1. Various measurements were taken from the finger plethysmographic records of 30 normal subjects, to whom was also administered the Bell Adjustment Inventory.

2. By means of factorial analysis three factors were determined, viz. (a) emotional stability, common to the Bell variables and the rate of finger volume change, (b) a possible emotional tension factor, highly loaded in absolute pulse volume before the tasks, and (c) a factor specific to the cold water test.

3. The results of the factor analysis, the correlation of .409 between Bell emotional adjustment and R, as well as the partial correlation of .687 between the above named variables when the effects of Factor 2 were eliminated, show that the rate of the reflex finger volume change (R) is a valid measure of emotional stability (as tested by the Bell Inventory).

4. The comparison of two groups consisting of labile and stabile subjects using the Bell Inventory as criterium shows that R differentiates between individuals who are emotionally stable and unstable.

5. If the effect of absolute pulse volume before tasks (P) is eliminated from the individual R scores, the correlation between R and Bell emotional adjustment increases from .409 to .504.

6. An R score of .200 was found to be an effective norm for diagnosing emotionally unstable individuals.

7. The Goetz finger plethysmograph proves to be a useful means of measuring emotional stability. (Authors' abstr.)

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 *Autonomic and Somatic Reactions Induced by Stimulation of the Cingular
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A Study of the Effects of Anaesthesia and Asphyxia on the Mono-synaptic Pathway through the Spinal Cord.

The anaesthetic nembutal, though depressing the activity of all components of the mono-synaptic pathway, produces a block in transmission essentially by stabilizing the motoneurone membrane so that the synaptic potential no longer initiates the discharge of impulses.

Asphyxia produces a brief depression, which is quickly followed by a period of hyperexcitability attributable to depolarization of the membranes of the afferent nerve fibres and the motoneurone somas. With continued asphyxia the depolarization progresses so that eventually there is failure of impulse propagation. This first becomes evident with orthodromic impulses in the presynaptic fibres and later with the antidromic propagation from axon to soma. Presumably variations in oxygen requirement determine this order of failure of the components of the pathway.

Oxygen-lack has the same effect as asphyxia except for the absence of an early transient depression of activity which precedes the phase of hyperexcitability.

Sudden readmission of oxygen during the period of asphyxial or anoxic hyperexcitability results in a depression.

Carbon dioxide excess produces pure depression of the mono-synaptic pathway. The accumulation of carbon dioxide explains the early depression in asphyxia, and, together with less diffusible products of anoxial metabolism, it accounts for the depression on sudden readmission of oxygen. During the period of hyperexcitability this depressant action would be submerged by the preponderating excitatory action of the partial depolarization. (Authors' abstr.)

The Electroencephalogram after Prolonged Brain Asphyxiation.

The EEG was recorded at regular intervals after asphyxiations of the brain of 10 to 30 minutes' duration.

The EEG after the shorter asphyxiations was characterized by short (1-2 seconds' duration) bursts of activity, with a wave-frequency of 7 to 12 seconds, repeated 10 to 20 times per minute. Evidence is presented for the cortical origin of these bursts.

The EEG after the longer asphyxiations is characterized by spindles of activity of longer (10 to 20 seconds) durations, with a wave-frequency of 12 to 16 seconds, which are repeated with intervals varying from a few seconds to about one minute. Evidence is presented for the view that the source of the potentials recorded as spindles is an unidentified subcortical structure centrally located in the brain.

(Author's abstr.)

Autonomic and Somatic Reactions Induced by Stimulation of the Cingular Gyrus in Dogs.

In five dogs the cingular gyrus was exposed by partial ablation of the opposite cerebral hemisphere. Electrical stimulation of moderate intensity or chemical stimulation with acetyl-beta-methylcholine produced responses in the somatic as well as in the autonomic realm. The experimental results suggest the existence of different functional areas in the cingular gyrus. Bladder contractions and other autonomic reactions can be obtained from the caudal third of the gyrus. Less conspicuous and of different character are the blood pressure and respiratory reactions obtained from the rostral third. The middle portion yields inconstant autonomic responses.

Stimulation of the rostral part usually suppresses the activity of somatic musculature, but may at times, as observed in one dog, evoke a slow tonic bilateral extensor reaction. This may indicate a connection with the striopallidum.

A definite interpretation of these reactions as to the significance of the cingular gyrus in the normal performance of either biological or psychological functions should await further research into this area. (Author's abstr.)

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*Reflex Development in the Chronically Spinal Cat and Dog. McCouch, G. P.	425
*Mechanism of Nerve Conduction Block Produced by Anticholesterinases. Toman, J. E. P., et al.	429

Further Observations on the Spreading Depression of Activity in the Cerebral Cortex.

A slow voltage variation having a duration of 4 to 6 minutes accompanies the spreading depression of activity in the rabbit's cerebral cortex. Each cortical region first becomes negative with respect to an extracortical reference electrode for 1 to 2 minutes. This negativity reaches, within 0.5 to 1 minute, a maximum of 8 to 15 mv. and then decreases somewhat more rapidly. The region then becomes positive for 3 to 5 minutes, this phase having usually a smaller amplitude than the negative.

A sudden cortical anemia, resulting from a 1-minute arterial occlusion, abolishes the "spontaneous" electrical activity of the cortex without itself inducing a slow voltage variation, but it promptly and profoundly alters the slow voltage variation accompanying the spreading depression of activity. This alteration consists essentially of a prolongation and an increase of the negativity. In a cortex, in no part of which a spreading depression of activity is in progress at the time, interruption of the circulation for longer periods induces a slow voltage variation only 2.5 to 5 minutes after the arterial occlusion, at which time the cortex becomes negative. The cortex then remains negative for as long as the circulation is interrupted (up to at least 12 minutes).

If the prolonged anemia is started while a region is involved in a spreading depression of activity and exhibiting the slow voltage variation, then the negativity, promptly induced in the region, persists for as long as the arteries are occluded (up to 12 minutes).

The results seem to indicate that in the spreading depression of activity, a change of the same nature as one resulting from prolonged interruption of the circulation occurs in the cerebral cortex. The electrical sign of this change is the negative voltage variation. (Author's abstr.)

Tectal and Bulbopontine Eyelid Reflexes and Mechanism of the Sleeping Attitude of the Acute Thalamic Pigeon.

Previous reports have shown that the superficial layers of the avian tectum opticum contain neurones which produce an opening of the contralateral eye

when locally strychninized or faradized. In the present paper the influence of these neurones on the palpebral opening reflexes and their relationships with the cerebral hemispheres and with the bulbo-pontine centers have been investigated in thalamic and hemidecerebrated pigeons and owls. In addition, an attempt has been made to elucidate the mechanism of the well-known sleeping attitude described by Rolando and Flourens in the acute decerebrated pigeon.

1. After subliminal strychninization of the tectal eyelid neurones a lowering of the threshold for tactile, labyrinthine and acoustic palpebral reflexes has been observed in the contralateral eye.

2. After acute extirpation of a cerebral hemisphere in a chronic hemidecerebrated pigeon lowers the threshold for the opening eyelid reflexes is lower in the eye contralateral to the hemisphere first removed. This reflex asymmetry is not prevented by local chloroforming or by total extirpation of the optic lobe ipsilateral to the hemisphere first removed.

3. Hypnotic doses of chloralose (and also of urethane and dial) injected in chronic, hemidecerebrated pigeons close the crossed "decerebrated" eye, as if the animal were sleeping on this side only.

4. Abolition of the faradic and strychnine excitability of the tectal lid neurones by local chloroforming does not increase the threshold of the lid reflexes in the contralateral eye; on the other side the total unilateral removal of an optic lobe in the thalamic pigeon is never followed by the appearance of lid asymmetries.

(Author's abstr.)

Reflex Development in the Chronically Spinal Cat and Dog.

The course of development of reflex activity after spinal transection has been followed in 34 cats and 17 dogs.

Differences between the two species are noted in regard to reflex pattern, duration of spinal shock, degree of atrophy, and susceptibility to ulcers.

(Author's abstr.)

Mechanism of Nerve Conduction Block Produced by Anticholinesterases.

DFP and eserine, like procaine but unlike KCl, were found to produce conduction block in frog sciatic nerve in concentrations which did not reduce the demarcation potential.

DFP, eserine and procaine consistently increased threshold prior to conduction failure. DFP also increased threshold in concentrations which were inadequate to block conduction. These effects were demonstrable at the stimulating cathode. KCl consistently decreased threshold in frog sciatic nerve during progressive conduction failure.

DFP, eserine and procaine decreased conduction velocity concomitantly with increase in threshold. Conduction failure occurred when conduction time was approximately doubled. In contrast, KCl had little effect on conduction velocity.

DFP and eserine had relatively little effect on recovery of excitability until the terminal stage of conduction block, at which stage they abolished the super-normal period of excitability in the remaining conducting fibers. Most of the above actions were reproduced in single giant fibres of the ventral cord of the earthworm, with the exception that KCl failed to decrease threshold. In addition, it was found that action potential amplitude remained relatively normal until conduction block was imminent in earthworm preparations treated with DFP, eserine or procaine. In contrast, KCl progressively reduced action potential amplitude.

High concentrations of acetylcholine were without effect on properties of frog sciatic nerve when applied during the course of DFP action or after recovery from DFP block. Frog sciatic nerve was found to accelerate the hydrolysis of DFP, probably through an enzymatic action. Partial recovery of conduction was found to occur in frog sciatic nerve even after prolonged DFP block. It is concluded that DFP and eserine in high concentrations abolish nerve conduction by increasing the excitation threshold, and it is suggested that this action may be unrelated to the anti-cholinesterasic activity shown by these drugs in lower concentrations. It is further concluded that these observations do not support the conception of an excitatory role of acetylcholine in the propagation of nerve

impulses, since conduction block by DFP or eserine was accomplished without the intervention of depolarization or of excitatory effects, contrary to the implications of the acetylcholine hypothesis. (Authors' abstr.)

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Depressions and Anxiety States of the Middle-aged Man.

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It is shown that hormonal treatment relieves the patient of his constitutional symptoms in every case. The relief of the physical complaints has a beneficial influence on the emotional manifestations, and if these are mild they may disappear completely. If the psychological changes are very severe, however, hormonal treatment is insufficient and deep psychotherapy or electric convulsive treatment is necessary. (Authors' abstr.)

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1. Psychiatry, Biochemistry, Physiology, etc.

Dictatorship of the Psychopaths. (2nd rev. ed.) *Nissen, I.* Oslo : Aschehoug, 1946, pp. 255. N. Kr. 10.

Nissen's analysis of the psychology of German fascism affords the hypothesis that psychopathy is the ground of fascist ideology. Its power-policy is a rationalization at large of the psychopathic aggression characterizing the Nazi leaders. Profiting from his many years of experience as a psychotherapist of the Adlerian school, Nissen discusses the psychopathic behavior, described as a remarkably irrational struggle for gaining power in all life situations. In a social group psychopaths will automatically endanger democracy. The Nazistic attitude, with its tremendous aggressive force, its untrue propaganda, its policy of intrigue, etc., is formed as compensation for social insecurity. The affinity among the members of such a group is increased by its patriarchic structure. Analyzing historical and sociological trends in the German "Völk," the author finds the development of "men-groups" prevailing, with its ideology of masculinity and ascetism, potential and manifest homosexual tendencies, and the truncation of the function of females except that of child-bearing.

F. FLUGE (Psychol. Abstr.).

Potentiometric Micro Method for the Determination of Cholinesterase. *Delaunois, A. L., and Casier, H.* [*Experientia*, **2**, 147-8 (1946); cf. *C. A.*, **40**, 4759¹.]

The authors re-emphasize the fact that the use of the Sb electrode offers a more simple, even if less exact, method of measuring cholinesterase than the glass electrode. They believe the use of 0.2 c.c. of serum is not a disadvantage, and that the method of Sanz using 0.05-0.01 c.c. should be designated a micromicro method. They correct an error in the text, stating that N/200 should read 0.02 N.

C. RIEGEL (Chem. Abstr.).

Blood Cholinesterase. *Augustinsson, Klas Bertil* (Stockholms Högskola, Biochem. Inst., Sweden). [*Arkiv. Kemi, Mineral. Geol. A*18, No. 24, 16 pp. (1945) (in English).]

Cholinesterase from serum (I) and erythrocytes (II) were compared. (I) is stable over a wider range of pH (6-10) than is (II) (pH 7.18-8.12). At neutrality (II) migrates twice as fast as (I). (II) has an isoelectric point of 4.65-4.70, while (I) has one of 4.36. Both are closely related to albumin. (I) may be prepared from serum as follows: $(\text{NH}_4)_2\text{SO}_4$ is added to 50 per cent. saturation, thereby removing globulins; the filtrate is brought to pH 4.5 removing albumin; (I) is precipitated from the filtrate with $(\text{NH}_4)_2\text{SO}_4$ at 70 per cent. saturation. While the action of erythrocytes on acetylcholine was not proven, evidence was found indicating that the factor in serum which hydrolyzes acetylcholine is the same factor which destroys acetylcholine.

A. J. G. (Chem. Abstr.).

Action of Some Vitamins on Acetylcholinesterase. *Reggianini, O.* (Univ. Bologna, Italy). [*Boll. soc. ital. biol. sper.*, **22**, 982 (1946).]

Large doses of vitamins were injected into guinea-pigs daily or at various intervals. Vitamins A, D, K and PP had no effect on the acetylcholinesterase activity of the brain. Vitamin B₁ produced an average increase of 27.4 per cent. and vitamin C an increase of 11.7 per cent. in this activity.

HELEN LEE GRUEHL (Chem. Abstr.).

Changes in Activity of Cholinesterase in the Ontogenesis of Mammals. *Kakushkina, E. A., and Arkhipova, A. D.* (Biol. Museum, Moscow). [*Byull. Ekspil. Biol. Med.*, **11**, 533-5 (1941).]

Rabbits at various stages of embryonic and post-embryonic life (up to 1 year) showed a very low level of cholinesterase in 15-day embryos, rising to a maximum

at 30 days (i.e., near the end of embryonic life), increasing after birth, and reaching adult level after 12 days. In the process of development of individual reflexes, the activity of cholinesterase increases. G. M. KOSOLAPOFF (Chem. Abstr.).

Blood Acetylcholine Content in Unconditioned and Conditioned Stimulation. Prokopenko, V. G. [Byull. Ekspil. Biol. Med., **11**, 326-7 (1941); cf. C. A., **38**, 4299¹.]

Blood acetylcholine was determined (leech-muscle method) in dogs in unconditioned (normal feeding) and conditioned (usual surroundings of feeding) stimulation. After 1-1.5 hours in the first case and 15-20 minutes in the second case the blood began to show acetylcholine-like properties, whereas in a hungry dog it did not react with the leech muscle. Thus during gastric activity dog blood contains a vagus substance which is one of the active humoral factors regulating the activity of the intestinal tract. G. M. KOSOLAPOFF (Chem. Abstr.).

Chemical Nature of the Active Substance Appearing in the Sympathetic Ganglion during Stimulation of its Preganglionic Fibers. Medvedev, V. M. (Med. Inst., Kazan). [Byull. Ekspil. Biol. Med., **11**, 432-4 (1941).]

The action of acetylcholine, of excitation of preganglionic fibers, and of "active perfusate" (perfusion fluid from the veins of the sympathetic ganglion collected during excitation of preganglionic fibers) on the sympathetic ganglion of the cat was studied under the influence of either paralyzing (nicotine, atropine) or sensitizing substances (eserine, cocaine). The first class of agents produced a lack of response to electric stimulation of fibers or to "active perfusate"; acetylcholine gave a distinct muscular contraction; eserine sensitized the ganglion only to acetylcholine, while cocaine increased the effects of all three excitation factors. Hence, a substance similar to adrenaline, rather than acetylcholine, is the excitation carrier.

(II) Senkevich, I. V. (State Med. Inst., Kazan). [Ibid., 435-8.]

From experiments on cats after cutting the post-ganglionic fibers on one side of the animal, thus depending upon blood to carry the stimulating substance to the other side of the animal for manifestation of muscular response to the excitation of preganglionic fibers, the active material can actually be transported by the blood. Sympathin (name given to material which forms during excitation of post-ganglionic fibers) is not identical with this substance, which is also apparently not identical with acetylcholine. Its nature remains open.

G. M. KOSOLAPOFF (Chem. Abstr.).

Inhibition of Creatine Phosphate and Acetylcholine Breakdown in Nerve Extracts by Procaine. Rapp, Gustav Wm. (Chicago Coll. of Dental Surgery). [Arch. Biochem., **12**, 13-17 (1947); cf. The Bur, **45**, 13 (1945).]

An enzyme system is present in the extracts from the frog sciatic nerve which catalyzes a reaction between acetylcholine and creatine phosphate, and this reaction is inhibited in the presence of procaine. V. L. F. (Chem. Abstr.).

Effect of Acetylcholine and Physostigmine on Tetanic Contraction. Babskii, E. B., and Korenevskaya, O. G. (Lenin State Pedagogic Inst., Moscow). [Byull. Ekspil. Biol. Med., **22**, No. 9, 29-32 (1946).]

Acetylcholine and atropine have no effect on tetanic contractions by nerve stimuli of the frog gastrocnemius muscle-ischiadic nerve preparation. Physostigmine antagonizes these contractions, not by inhibition of cholinesterase, but by some other mechanism. Physostigmine seems to inhibit some other enzyme system which causes the hyperirritability; there is no simple relationship between this system and that responsible for absolute and relative contractility of the muscle. Veratrine increases and prolongs the tetanic contractions in concentrations which have no effect on refractivity. H. A. WEGNER (Chem. Abstr.).

The Action of Acetylcholine on Frog Motor Nerves. Sozer, Furuzan (Univ. Istanbul, Turkey). [*Compt. rend. ann. et arch. soc. turq. sci. phys. et nat.*, **13**, 71-3 (1947) (in German).]

While the rheobase of frog motor nerves was not altered by 0.1-0.0001 per cent. of acetylcholine (I), the chronaxia of normal and of degenerated nerves was extended by 0.1 per cent. of (I), reduced in 80 per cent. of the experiments by 0.01 per cent. of (I), and extended again in 50 per cent. of the experiments by 0.001 per cent. (I). The extension of chronaxia was accompanied by a reduction of the velocity of transmission. An extension of the chronaxia was produced by 0.01-0.0001 per cent. thiamine.

FELIX HAUROWITZ (Chem. Abstr.).

The Role of Acetylcholine in Paraphylactic (Anaphylactic) Shock. Antiparaphylaxis by Tissue Decholinization. Danielopolu, D., and Bruckner, I. (*1-ère Clin. Méd., Bucharest, Roumanie*, **18**, 143-5 (1946).)

Experiments were performed on intestine isolated from guinea-pigs prepared 20 days previously with horse serum (I) and egg albumin (II). Addition to the bath of 0.1, 0.4 or 1 c.c. of (I) provoked a strong contraction owing to liberation of acetylcholine (III). Tonus returned to normal after washing and replacement of the Tyrode's solution. After 1-3 repetitions of this procedure no response to (I) was elicited, and addition of (II) was also without result. After 100 γ of (III) was added and the bath changed again, 0.4 c.c. of (II) produced a strong reaction. If (II) were added twice more, the intestine again became insensitive to (I) and (II). After another recholinization (I) provoked a violent reaction. Thus "anti-anaphylaxis" is merely exhaustion of tissue choline and not exhaustion of antibodies.

MARSHALL E. DEUTSCH (Chem. Abstr.).

New Facts showing that the Excitatory Action of Adrenaline on the Longitudinal Muscle of the Terminal End of the Guinea-pig Ileum is due to Acetylcholine Liberated Indirectly by the Action of Adrenaline. Danielopolu, D., and Popesco, M. (*1-ère Clin. Méd., Bucharest, Roumanie*). [*Bull. acad. méd. Roumanie*, **18**, 66-7 (1946).]

The organ was treated with 883F in a dose sufficient to inhibit the sympathomimetic action of adrenaline (I) without affecting its parasympathomimetic action, after which (I) still produced a contraction of the longitudinal fibers. After atropine, which has an effect opposite to that of 883F, (I) inhibited these fibers. The stimulating action of (I) on the fibers was thus due to the parasympathomimetic action produced by the compensatory cellular response to (I).

MARSHALL E. DEUTSCH (Chem. Abstr.).

Antiacetylcholinolytic and Antiadrenolytic Action of Strophanthin. Danielopolu, D., and Popa, Gr. Gr. (*1-ère Clin. Méd., Bucharest, Roumanie*). [*Bull. acad. méd. Roumanie*, **18**, 150-1 (1946).]

By use of a previously described method (cf. preceding abstr.), strophanthin is shown to have these actions.

MARSHALL E. DEUTSCH (Chem. Abstr.).

Antiacetylcholinolytic and Antiadrenolytic Action of Eserine. Danielopolu, D., and Popesco, M. [*Bull. acad. méd. Roumanie*, **18**, 104-5 (1946).]

By use of a previously described method (cf. preceding abstr.) eserine is shown to have these actions.

MARSHALL E. DEUTSCH (Chem. Abstr.).

Method for the Study of the Inactivation of Adrenaline and of Acetylcholine in Tissues and the Inactivating Action of Drugs on Cholinesterase and on the Adrenolytic Factors of Tissues. Danielopolu, D., and Popesco, M. (*1-ère Clin. Méd., Bucharest, Roumanie*). [*Bull. acad. méd. Roumanie*, **18**, 95-6 (1946).]

A very fine needle is inserted in the femoral artery of a dog, and the minimum amount of adrenaline (I) or acetylcholine (II) which clearly affects carotid pressure is determined. Very slow injection of small amounts of the drug to be tested into the femoral artery is followed by the minimum dosage of (I) or of (II). Inactivation of cholinesterase is then shown by a greater drop in carotid pressure due to (II),

and inactivation of the adrenolytic factors is shown by a greater rise due to (I). Before and after injection of the drug the effects of injection of (I) and (II) into an artery and into a vein are compared.

MARSHALL E. DUETSCH (Chem. Abstr.).

Influence of Neurine, Acetylcholine and Atropine upon the Lymph Flow in the Thoracic Duct. Yokozawa, Miyuki. [*Acta Schol. Med. Univ. Imp. Kioto*, **24**, 169-96 (1942).]

The intrafemoral or intraportal injection of neurine into dogs resulted in acceleration of lymph flow in the thoracic duct, an increase in albumin of lymph serum, and a higher portal blood pressure. Acetylcholine produced a similar but longer-lasting effect. Atropine counteracted these effects, more strongly those of neurine than those of acetylcholine. All three, however, decreased the volume of the liver and small intestine. After the ligation of the periportal hepatic lymph vessels neurine and acetylcholine still increased the lymph flow, but not albumin of lymph serum. The lymphagogous effect of neurine and acetylcholine depends to some degree on the output of adrenaline.

J. G. YOSHIOKA (Chem. Abstr.).

Synergistic Influence of Physostigmine on the Lymphagog Effect of Acetylcholine. Yokozawa, Miyuki. [*Acta Schol. Med. Univ. Imp. Kioto*, **25**, 1-18 (1943).]

In atropinized dogs physostigmine and acetylcholine were shown to act synergistically in raising portal venous pressure and increasing the lymph flow in the thoracic duct and also increasing the volume of the small intestine, but not that of the liver.

J. G. YOSHIOKA (Chem. Abstr.).

Electrogenic Properties of Acetylcholine. Barnes, T. C. [*Nature, Lond.*, **159**, 307 (1947).]

The electrogenic action of acetylcholine at the phase boundary between oils and aqueous solutions is discussed as the possible basis of the recorded electrical potential of cholinergic nerve impulses.

A. C. HOFFMAN (Psychol. Abstr.).

Influence of Certain Narcotics on the Sensitivity of Leech Muscle to Acetylcholine. Mikhel'son, M. Ya (Viem, Leningrad). [*Byull. Eksptl. Biol. Med. (U.S.S.R.)*, **11**, 230-3 (1941).]

Uneserinized specimens of dorsal and abdominal leech muscle were tested as to sensitivity to acetylcholine in the presence or absence of several narcotics. Morphine at 1×10^{-7} level increases sensitivity to acetylcholine (maximum at 10^{-3}); at 10^{-2} morphine causes its own contractions, owing to suppression of cholinesterase. Codeine was similar to morphine; diacetylmorphine has no such effect; papaverine increases sensitivity at 10^{-4} level. Ether causes considerable increase of acetylcholine sensitivity at 1/500-1/250 levels; CHCl_3 , however, does not increase acetylcholine sensitivity and at 5×10^{-5} itself serves to relax the muscle; both CHCl_3 and Et_2O have strong anticholinesterase actions. MeOH, EtOH, iso-BuOH and iso-AmOH gave the sensitizing effect only for the latter two (iso-AmOH stronger than iso-BuOH), although all four have some anticholinesterase action. Methylene blue is a very strong anticholinesterase agent and strongly sensitizes the leech muscle to acetylcholine. Leech muscle is proposed as the test material for comparative study of anticholinesterase agents.

G. M. KOSOLAPOFF (Chem. Abstr.).

The Mode of Action of Acetylcholine on Unstriated Muscle. Singh, Inderjit, and Singh, Mrs. Sunita Inderjit (Dow Med. Coll., Karachi). [*Current Sci. (India)*, **16**, 159 (1947).]

Acetylcholine and K, in concentrations such that neither alone will produce tonic contraction, together cause tonic contraction in frog-stomach muscle. That the contracture is due to the K is indicated by its continuance when acetylcholine is withdrawn and relaxation when the K is withdrawn.

FERRIN B. MORELAND (Chem. Abstr.).

Sensitization of Acetylcholine by Thiamine. Carvalho, Paulo de. [Arquiv. faculdade nacl. med. (Rio de Janeiro), **1**, 11-19 (1946) (English summary).]

The rate of hydrolysis of acetylcholine (I) dissolved in defibrinated dog blood is studied by determination of the blood pressure of anesthetized dogs. Twenty γ (I) per ml. blood are completely hydrolyzed within 2-3 minutes. Addition of 0.1 mgm. thiamine (II) simultaneously with (I) prolongs its effect to 5 minutes. If (II) is mixed with the blood 10-15 minutes before addition of (I) its action lasts 12-15 minutes, and if added 30 minutes before, the action lasts 1 hour. These results cannot be compared directly with those conducted *in vivo*.

K. SCHOEN (Chem. Abstr.).

The Chemical Nature of the Substances of Brain Tissue which render Muscles Sensitive to Acetylcholine. Babskii, E. B., and Minaev, P. F. (Acad. Med. Sci., Moscow). [Biokhimiya, **12**, 231-40 (1947); cf. C. A., **40**, 7258⁷.]

The substance which sensitizes brain tissue to acetylcholine is a compound containing a labile phosphate group, and is probably adenosinetriphosphate.

H. PRIESTLEY (Chem. Abstr.).

The Ultraviolet Absorption Spectrum of Cerebrospinal Fluid: Ascorbic versus Nucleic Acid. Strait, L. A., Aird, R. B., and Hrenoff, M. K. (Univ. of California Med. School, San Francisco). [Science, **106**, 64-5 (1947).]

The 265 $m\mu$ band of cerebrospinal fluid (CSF) is shown to be due to ascorbic acid and not nucleic acid as assumed by Spiegel-Adolf and Wycis (C. A., **41**, 1032f). The maximum ultraviolet absorption curves of CSF and ascorbic acid is shifted towards the shorter wave-lengths by a change in pH from 7 to 2, whereas a corresponding change in the pH of nucleic acid causes a slight shift in the opposite direction. The 265 $m\mu$ band of CSF responds to all decomposition tests for ascorbic acid. The residual absorption after destruction of ascorbic acid gives the so-called "S-shaped normal" curve. The observations of Spiegel *et al.* (Science, **105**, 208 (1947)) of the disappearance of the 265 $m\mu$ band from a fresh sample of CSF is what one might expect of ascorbic acid, and therefore cannot be accepted as evidence for a chromatolytic enzyme which splits nucleic acids. The ascorbic acid concentration of 80 samples of CSF from normal and abnormal patients ranged from 0.3 to 4.8 mgm. per cent. The ascorbic acid was determined by measuring the absorption before and after its destruction at pH 11, and the values agree with those of Wortis *et al.* (C. A., **32**, 7531¹).

A. DIETZ (Chem. Abstr.).

The Upper Limits of Normal Protein Concentration in the Cerebrospinal Fluid. Kafka, V. (Langbro Sjukhus Alvsjo, Stockholm). [Monatsschr. Psychiat. Neurol., **110**, 325-9 (1945).]

The discrepancies among normal values for protein (I) concentration in the cerebrospinal fluid (CSF), reported from different laboratories, are due in large part to analytical errors. Kafka discusses in detail his procedure (J. Neurol. Psychiat., **115**, 85 (1928)). Precipitation of (I) by Esbach's reagent (II) in special calibrated tubes, centrifugation under carefully controlled conditions, and direct reading of the volume of precipitate globulin (III) is determined by precipitation with saturated $(\text{NH}_4)_2\text{SO}_4$, centrifugation, careful removal of the supernatant liquid, solution of the residue in NaCl solution, and precipitation with (II) as before. Albumin (IV) is taken as the difference between (I) and (III). (IV) can be determined directly, but this is not recommended. The method for total (I) must be checked by control determinations on different amounts of a CSF of known (I) concentration. The method for (III) is checked by blank determinations on the reagents. The method does not give high precision, but the accuracy is sufficient for diagnostic purposes, and discrepancies between it and the Kjeldahl method (cf. Lindenmeyer, C. A., **40**, 105⁸) should not occur. In 95 per cent. of 333 CSF's qualitative agreement was found (normal or not) between Kafka's method and Bisgaard's HNO_3 serial dilution method.

W. M. S. (Chem. Abstr.).

Application of the Takata Quinine-spinal Fluid Reaction to Blood Serum. Ninni, Mario (Univ. Pavia, Italy). [Boll. soc. ital. biol. sper., **23**, 47-8 (1947).]

The test with the modifications for serum is carried out as follows: 1 c.c. of a 1:2, 1:4, 1:8, 1:16 and 1:32 dilution of serum in physiological saline is placed in tubes and 0.10 c.c. of 0.36 per cent. anhydrous Na_2CO_3 added and shaken; 0.20 c.c. 2 per cent. aqueous solution of quinine-HCl is added, shaken, and let set for 24 hours. Clear or slightly turbid solutions are considered negative, a definite white precipitation is positive. Experiments on 130 serums from various disturbances indicated that this test is a good indication of the eucooidity of a serum.

H. L. GRUEHL (Chem. Abstr.).

Changes in the Cerebrospinal Fluid and Blood in Vernaestival Encephalitis. III. *Disturbance of the Carbohydrate-Salt Metabolism in Acute and Chronic Stages of the Disease.* Mandel'boim, A. B. (Inst. Physiol., Acad. Sci., SSSR). [Byull. Eksptl. Biol. Med., **20**, No. 12, 42-5 (1945); cf. C. A., **40**, 7362^a.]

K, Ca, chlorides, and sugar were determined in blood and cerebrospinal fluid of cases with meningeal (I), hemiparetic (II), bulbar (III), polyradiculoneurotic (IV), serous meningitic (V), poliomyelitic (VI), hyperkinetic (VII), and atactic (VIII) syndromes. Except as noted there was no deviation from normal. The K level of the cerebrospinal fluid was variable in (VI) and high in (VII), and of the blood, low in (I). Ca in the fluid was normal to high in (II), (III), (IV) and (VII), and high in (VI) and (VIII). Blood Ca was normal to high in (VI) and (VII). The K:Ca ratio of cerebrospinal fluid and blood was low in (II), (III), (IV), (V) and (VI). Blood sugar was low in (VI), and fluid sugar was low in (I) and (IV) and irregular in (I), (II) and (III). Changes in salt equilibrium and carbohydrate metabolism in such cases are less than in other central nervous system diseases, and are attributed to disruption of the regulatory vegetative-endocrine centers by virus.

K. STARR CHESTER (Chem. Abstr.).

Biochemistry of the Sphingolipides. I. Preparation of Sphingolipides from Beef Brain and Spinal Cord. Carter, Herbert E., Haines, William J., Ledyard, W. E., and Norris, William P. (Univ. of Illinois, Urbana). [J. Biol. Chem., **169**, 77-82 (1947).]

A study was made of the various procedures reported for the isolation of cerebroside and sphingomyelin from nerve tissue. The procedure adopted involved dehydration with acetone, extraction by ether of the glycerophosphatides in the acetone-extracted residue, extraction of the acetone-ether-extracted residue with alcohol, and the precipitation of the sphingolipides by cooling overnight. One hundred pounds of fresh beef brain yielded 1,300 to 1,600 gm. of a crude sphingomyelin-cerebroside mixture; 100 lb. of beef spinal cord gave 2,200 to 2,500 gm. The total yield of cerebroside was 4.2 per cent. of the fresh weight of the spinal cord; the yield of sphingomyelin was 1.37 per cent.

JULIA O. HOLMES (Chem. Abstr.).

Influence of the Thyroid Hormone on the Formation of Mediators in the Central Nervous System. Kakushkina, E. A., and Tatariko, T. [Compt. rend. Acad. Sci., U.R.S.S., **55**, 359-61 (1947) (in French); cf. C. A., **41**, 5937^e.]

Hyperthyroidism induced by feeding large amounts of fresh thyroid to dogs had no effect on the acetylcholine-like substances in the brain; however, the activity of the esterase was diminished; this raises the "acetylcholine coefficient."

R. W. FLEMING (Chem. Abstr.).

Content of Calcium in Brain Tissue under Narcosis. Meglitskii, P. P., and Zinov'eva, M. T. (Inst. Med., Leningrad, U.S.S.R.). [Byull. Eksptl. Biol. Med., **20**, No. 4-5, 32-3 (1945).]

Experiments were carried out to determine the diffusible Ca in the brain before and after 30 minutes of ether narcosis. The animals used were guinea-pigs and rats. For the pigs, the average normal Ca content was 24.8 mgm. per cent.; after narcosis it rose to 41.8 mgm. per cent. For the rats, the average normal Ca content

was 37.9 mgm. per cent.; after narcosis it rose to 60.4 mgm. per cent. The content of water in the brain remained approximately the same before and after narcosis. S. GOTTLIEB (Chem. Abstr.).

Regulation of Organic Metabolism by the Upper Sympathetic Ganglion of the Neck, Sinel'nikov, E. M., and Bugaeva, M. G. (Ukrain. Research Inst. Stomatol., Odessa). [Byull. Ekspil. Biol. Med., 11, 442-5 (1941).]

After extirpation of the upper sympathetic ganglion of the neck in young dogs, teeth showed no change in inorganic composition (Ca, Mg and P), but there was a fairly regular (up to 3.5 per cent.) increase of the organic constituents.

G. M. KOSOLAPOFF (Chem. Abstr.).

Biochemical Foundations of Abnormal Behavior in Man. Hoagland, Hudson. [Ciencia e invest. (Buenos Aires), 3, 229-37 (1947).]

Previous research on the relationship between metabolism, and especially cerebral respiration, and psychic processes and disturbances is discussed. Further, the investigations on the connection between hypothalamus function and endocrine glands, ketosteroid elimination, the influence of the adrenals and pituitary on psychic function and enzyme deficiencies are reviewed.

A. E. MEYER (Chem. Abstr.).

Mechanism of the Action of Potassium on Nerve Refraction. Zol'nikova, A. I. (Central Inst. Neurology, Moscow, U.S.S.R.). [Byull. Ekspil. Biol. Med., 20, No. 10/11, 9-12 (1945).]

Sciatic-gastrocnemius preparations were made from the frog, and the absolute and relative refractory periods of the nerve after excitation by a single stimulus were measured. The influence of acetylcholine, KCl and atropine was studied. A 0.2-0.4 per cent. KCl concentration in Ringer's solution prolonged the refractory phase. This prolongation could be antagonized by atropine. Experiments show that the effect of K is due to its ability to release acetylcholine.

S. GOTTLIEB (Chem. Abstr.).

Nervous Regulation of the Anterior Hypophysis. I. Excitants of the Central Nervous System (Picrotoxin and Metrazole) and the Estrus Cycle of the Rat. Ubatuba, Fernando (Inst. Oswaldo Cruz, Rio de Janeiro). [Rev. Brasil. Biol., 7, 203-14 (1947).]

In adult rats intravenous injections of convulsant doses of picrotoxin or metrazole during or between estrus periods failed to disturb the estrual rhythm or to induce pseudopregnancy. Presumably the drugs do not provoke the release of luteinizing hormone by the anterior hypophysis.

L. E. GILSON (Chem. Abstr.).

Section of the Hypothalamus to Remove the Hyperglycemic Effect of Urethan. De, P. (Med. Coll., Calcutta). [Indian J. Med. Research, 34, 185-7 (1946).]

The persistent hyperglycemia characteristic in the cat under urethan anesthesia gradually subsides after section of the hypothalamus. The plane of section passes from the anterior border of the superior corpora quadrigemina through or behind the mammillary bodies.

M. H. POWER (Chem. Abstr.).

Effect Produced by Lesions of the Hypothalamic Region on the Carbohydrate Metabolism. Rusishvili, G. G., and Yankovskaya, Ts. L. (Pavlov Physiol. Inst., U.S.S.R.). [J. Physiol. (U.S.S.R.), 32, 223-8 (1946) (in Russian).]

Lesions were produced in the hypothalamic region of three dogs, and observations on the carbohydrate metabolism were made. None of the dogs under observation showed hyperglycemia. Marked hypoglycemia in the post-operative period coincided with severe general disturbances and epileptic fits. A therapy of massive sugar administrations proved beneficial in these cases.

S. GOTTLIEB (Chem. Abstr.).

- 1 *Method of Screening Sympathomimetic Amines for Stimulant Action on the Cerebrum.* Clymer, Nancy V., and Seifter, Joseph (Wyeth Inst., Philadelphia, Pa.). [*J. Pharmacol.*, **89**, 149-52 (1947).]

Young chicks react to amphetamine (I) in a characteristic manner. The syndrome produced by injecting 2-5 mgm. of (I) develops in three stages. The first two stages take place 1-2 minutes after the injection, and consist of vigorous head movements and ruffled feathers accompanied by a forward tilt of the body and drooping wings. The third stage, about 3 minutes after the injection, is the crucial test for (I). Under the influence of (I), the ordinary intermittent peeping of the chick becomes a continuous twitter, about 250 times per minute, and sometimes may even become a warble. This twittering reaction may last an hour. Corneal anesthesia and a failure to respond when the toes were pinched were noted at the height of the reaction. Of 60 compounds, including the more commonly used sympathomimetic amines, only *d*-amphetamine, *dl*-amphetamine (benzedrine), *d*-desoxyephedrine, β -phenyl- α -aminobutane, and β -phenyl-tert-butylamine produced the twittering reaction. Of the other compounds some produced none of the above effects, some produced the first two stages, and synephrine and neo-synephrine produced lethargy. Other effects of each compound are described. Only chicks 1 day to 3 weeks old showed the twittering reaction with (I). Squabs, pigeons and hens ejected food and the pigeons lost the ability to fly. Canaries exhibited convulsions, and day-old ducklings showed excitement only. Attempts to abolish the syndrome by sympatholytic drugs were in general unsuccessful.

L. E. GILSON (Chem. Abstr.).

- A *Method of Estimating Curare-like Activity on the Isolated Phrenic Nerve Diaphragm Preparation of the Rat.* Chou, T. C. (Dept. Pharmacol., Oxford, Eng.). [*Brit. J. Pharmacol.*, **2**, 1-7 (1947).]

The phrenic nerve diaphragm preparation was stimulated to maximum contractions by condenser discharges from a neon lamp circuit, contractions being recorded by isotonic lever. The muscle was immersed in Tyrode's solution fortified with glucose, oxygenated with a stream of 95 per cent. O-5 per cent. CO₂, the bath being at 37-38° and having a capacity of 100 ml. The Tyrode was changed four times during 13 minutes between addition of drugs. Drugs were allowed to act for 3 minutes. Percentage inhibition was determined by measuring the height of contraction just before tubocurarine was added to the bath, and again 3 minutes later. The curare action is less at slower rates of stimulation (5/minutes) than at faster rates (20/minutes). At rates greater than 20/minutes recovery was slow owing to fatigue. Curare action is less in pure O than in O-CO₂ mixtures. The overall error of the method is about 6 per cent.

WM. M. GOVIER (Chem. Abstr.).

- Nerve Centers and Sugar Regulation.* Marinelli, Luigi, Giunti, Valentino, and Discepoli, Giuseppe (Univ. Perugia). [*Arch. sci. med.*, **83**, 174-80 (1947).]

Measured quantities of glucose were injected into the spinal canal in dogs. This was followed by a decrease in blood sugar with a min. after 30 minutes. Return to normal occurred after 2 hours. Conclusion: Glucose stimulates nervous centers directly.

A. E. MEYER (Chem. Abstr.).

- Adenylpyrophosphatase in Brain, Liver, Heart and Muscle of Chick Embryos and Hatched Chicks.* Moog, Florence (Washington Univ., St. Louis, Missouri). [*J. Expil. Zool.*, **105**, 209-20 (1947).]

Adenylpyrophosphatase (I) activity was followed in the organs of the developing chick from the 12 days of incubation till 14 days after hatching. It increases during that time. The (I) content of the brain rises steadily, and reaches a maximum at 7 days after hatching. The chick becomes increasingly vigorous and alert during this time. (I) activity in skeletal muscle reaches a maximum at hatching when the first functional demands are made on this tissue; then it declines slightly to the adult level. Cardiac (I) reaches a maximum at 16 days of incubation, declines at hatching, and then increases to the adult level. Anoxemia may be responsible for the decline of (I) at hatching. Liver (I) becomes sensitive to Ca

activation at hatching. If Ca is not added, (I) activity remains nearly constant throughout the period; but when present, (I) activity rises sharply after hatching. The method of Moog and Steinback (*C. A.*, **39**, 4942²) was used for (I) determination.
C. H. RICHARDSON (Chem. Abstr.).

Variations in Vitamin B₁ Content of the Brain in Experimental Hyperthyroidism. Rossi, C. A., and Moruzzi, G. (Univ. Bologna, Italy). [*Boll. soc. ital. biol. sper.*, **22**, 1146-8 (1946).]

Rabbits were made hyperthyroid by daily intramuscular injections of 100r/γgm. of thyroxine. The vitamin B₁ titer of the brain (Rittsert determination) diminished about 80 per cent. in 30 days.
HELEN LEE GRUEHL (Chem. Abstr.).

Indophenol Oxidase of the Central Nervous System. VI. Action of Sodium Cyanide and Carbon Monoxide on the Indophenol Oxidase of the Nerves. Mitolo, Michele, Sgarbetta, Vincenzo and Marzano, Giuseppe (Univ. Bari, Italy). [*Boll. soc. ital. biol. sper.*, **22**, 971-4 (1946); cf. *C. A.*, **41**, 2167h.]

NaCN was injected into various animal species in lethal doses; CO was inhaled until it caused death. The nerves were excised immediately and indophenol oxidase determined by the Mitolo photometric micro-method (*C. A.*, **40**, 5821²). NaCN notably inhibited the indophenol oxidase power of the nerves, but rarely entirely inhibited it. The toxic action of CO was much less intense, and in some nerve sections there was even an occasional increase in indophenol oxidase.

VII. Action of Convulsive Poisons on the Indophenol Oxidase of the Nerves. Mitolo, Michele, Scaramuzzi, Franca, and D'Alessandro, Angela. [*Ibid.*, 974-7.]

Lethal doses of strychnine or quinine or convulsive doses of caffeine, codeine, dionine or heroin were injected into various animals and birds. In general the convulsive drugs increased the indophenol oxidase in the nerves, but this effect varied with the different animal species. In the rabbit there was generally a diminution.

IX. Action of some Reduction Oxidation Indicators and Eosin on the Indophenol Oxidase of the Nerves. Mitolo, Michele, Borgia, Carlo E., and Salerno, Michelina. [*Ibid.*, 1066-9.]

Guinea-pigs were injected with small innocuous doses of 2, 6-dichlorophenol-indophenol, thionine, the chloride of brilliant cresyl blue, methylene blue, or eosin. Various portions of the nerves were excised 30 minutes after injection. Methylene blue, thionine, and 2, 6-dichlorophenol-indophenol inhibited the indophenol oxidase activity of the nerves, while brilliant cresyl blue increased it, and protected the animal from NaCN intoxication. Small doses of eosin diminished the indophenol oxidase activity.
HELEN LEE GRUEHL (Chem. Abstr.).

Nicotinic Acid, Tryptophan and Pellagra. Biological Research and New Problems of Human Physiology. Chiancone, F. M. (Lab. Recherche Lepetit S. A., Milan). [*Vitaminologica (Milan)*, 1946, 97-9; cf. *C. A.*, **39**, 3339¹.]

There is discussed the role of nicotinic acid in human pellagra, black tongue of dogs, and fowl dermatosis, and its synthesis from tryptophan in rats, but not in man. Rats deprived of pyridoxine eliminated xanthurenic acid (4, 8-dihydroxy-quinoline-2-carboxylic acid) in the urine, but not quinurenic acid (cf. Axelrod, Morgan and Lepkovsky, *C. A.*, **40**, 626⁵). Rats were fed an excess of nicotinamide and an indication was found of increased elimination of xanthurenic acid.

E. L. GREEN (Chem. Abstr.).

Sympathicomimetic Substances Extracted from Nerves and Tissues of Mammals. Bacq, Z. M., and Fischer, P. (Univ. Liege, Belg.). [*Arch. intern. physiol.*, **55**, 73-91 (1947).]

By comparison of the simultaneous contractions of the nictitating membrane and uterus of the non-pregnant anesthetized cat it was possible to indicate that extracts of the spleen of ox, cow, calf, horse and dog contained only arterenol,

extracts of coronary nerves of human coronary arteries contained only adrenaline, while extracts of splenic nerves and sympathetic system of horse and calf contained both substances.

H. L. WILLIAMS (Chem. Abstr.).

The Neuro-regenerative Growth Substance "NR." (III). Koechlin, B., and Muralt, A. von (Univ. Bern, Switz.). [Helv. Chim. Acta, 30, 519-24 (1947) (in German); cf. C. A., 40, 1571⁷.]

The "NR" substance (I) previously described is a non-proteinaceous, H_2O -soluble dialyzable compound of low molecular weight found in brain. Active extracts can also be prepared from peripheral nerves and the spinal cord. The (I) is found chiefly in the white matter of the brain, while the grey matter is only slightly active. Brain (with cerebellum and medulla) from a freshly slaughtered animal is stripped of the pia mater and coarsest blood vessels, and ground at 4° in isotonic salt solution. The cells must be well disintegrated. Dialysis of the mixture gives a clear yellowish dialyzate containing most of the activity. An optimum dilution of the dialyzate can be found, above and below where activity is decreased. This is attributed to the possible presence of an "NR" inhibitor. As a 1 c.c. injection of active material corresponds to only 1 mgm. of moist brain tissue, "NR" is present and effective in very small amounts.

IVAN A. WOLFF (Chem. Abstr.).

The Excitation by Succinic Acid of the Respiratory Center of the Dog in Apnea of hyperventilation. Bovet, Daniel, Monod, Jacques, and Lwoff, Andre. [Compt. rend., 224, 1844-6 (1947).]

Injection of 5-200 mgm. $NaHCO_3$ per kgm. into the saphenous vein or the carotid of the anesthetized dog in apnea from hyperventilation restored the action of the respiratory center as indicated by movements of the diaphragm. HCl had a similar action due to mobilization of alkali reserves. Injection of sodium succinate (I) gave the same results as $NaHCO_3$. In some dogs the injection into the saphenous vein of 5 mgm. (I) per kgm. restored movements of the diaphragm in 5-6 seconds, while others required 20-50 mgm. per kgm. The latent period was shorter when (I) was injected into the carotid. Certain animals did not react to either $NaHCO_3$ or (I). After the injection of glucose or EtOH (I) was ineffective, but Na salts of *l*-malic, fumaric and aspartic acids showed action. Na acetate, propionate and butyrate were inactive except in one instance when the butyrate showed weak activity. In the absence of CO_2 the nerve cell is deprived of diacids and other products essential to its metabolism. The fact that $NaHCO_3$ and (I) are inactive in some cases show that the effects of CO_2 deficiency are complex.

M. O. A. (Chem. Abstr.).

Action of Phenylisopropylamine on Neuromuscular Excitability. Boriani, A. (Univ. Bologna, Italy). [Boll. soc. ital. biol. sper., 23, 11-13 (1947).]

Phenylisopropylamine acting *in situ* on the gastrocnemius muscle and sciatic nerve of *Rana esculenta* greatly diminished the excitability of each.

HELEN LEE GRUEHL (Chem. Abstr.).

2. Pharmacology and Treatment.

Comparative Central-depressant Actions of some Ring-substituted Phenobarbitals. Alles, Gordon A., Ellis, Charles H., Feigen, George A., and Redemann, Mildred A. [Univ. Calif. (Berkeley) Pubs. Pharmacol., 2, 173-81 (1946); cf. C. A., 41, 4573f.]

In a group of ring alkyl-substituted derivatives (m-Me, p-Me, p-Et, p-iso-Pr, p-tert-Bu, p-OMe, 3, 4- O_2CH_3) of phenobarbital, the hypnotic effect always was less than that of phenobarbital itself; this was especially true of the p-OMe and the 3, 4- O_2CH_3 derivatives. Only the Me derivatives were comparable to phenobarbital in therapeutic index. In anticonvulsant action all the derivatives were inferior to phenobarbital, and exerted such action markedly only in hypnotic or lethal doses.

JOSEPH S. HEPBURN (Chem. Abstr.).

Conditions of Mechanical Sensitivity of the Carotid Sinus under Barbiturate Anesthesia. Panashchenko, A. D. [*J. Physiol. (U.S.S.R.)*, **32**, 287-91 (1946) (in Russian).]

Hexenal and sonbutal were used in rabbits and cats. Control experiments on non-anesthetized animals showed that mechanical stimulation produced a fall in the blood pressure with no marked changes in respiration. A much stronger effect on the blood pressure was produced under conditions where the sensitivity of the medullary centers and the receptors was changed by compressing the common carotid arteries. In this case the respiratory changes were variable. Similar experiments with both sonbutal and ether produced, in complete anesthesia, a drop in the blood pressure, and in incomplete anesthesia, no change in the blood pressure. In both kinds of narcosis respiration changes were variable. Hexenal anesthesia, whether complete or incomplete, failed to produce any blood-pressure changes indicative of a change in sensitivity of the pressure-sensitive receptors of the carotid sinus. Respiration was usually found to be inhibited.

S. GOTTLIEB (Chem. Abstr.).

The Carbohydrate Metabolism during Prolonged Pentothal Anesthesia in Dogs. 1. *The Blood Sugar and the Liver Glycogen.* Booker, Walter M. (Howard Univ. School of Med., Washington, D.C.). [*Anesthesiology*, **7**, 405-15 (1946).]

The changes in blood sugar and in liver glycogen in dogs under prolonged pentothal (I) anesthesia are described. Evidence is presented tending to show interruption of the normal glycogenic-glycogenolytic activity of the liver under prolonged anesthesia. It appears that livers of animals deprived of food do not polymerize glucose under prolonged (I) anesthesia, and that prolonged anesthesia with (I) seems to decrease markedly the liver glycogen. The liver-function tests indicate that the liver is severely taxed during prolonged (I) anesthesia which may affect the normal functioning of the carbohydrate enzyme system at the site of the liver. The experiments raise the question as to the effectiveness of glucose administrations during prolonged (I) anesthesia to protect the liver, since excess glucose is not converted into glycogen during prolonged (I) anesthesia in animals on a normal diet, and since there is a breakdown of the stored liver glycogen in animals on a normal and on a high-carbohydrate diet.

RUTH BERGGREN (Chem. Abstr.).

Influence of Sex and Age in Acute Barbiturism. Donatelli, L. (Univ. Firenze, Italy). [*Boll. soc. ital. biol. per.*, **22**, 853-4 (1946).]

On the basis of clinical studies and tests on guinea-pigs, rabbits and mice, it was concluded that there was great individual variation in susceptibility to barbiturate intoxication within a species and even in the same individual under various conditions. In general, females were less susceptible than males. Men over 50 were a great deal more susceptible than younger men.

HELEN LEE GRUEHL (Chem. Abstr.).

Age, Sex and Acute Barbiturate Intoxication. Donatelli, Leonardo (Univ. Firenze, Italy). [*Arch. Intern. Pharmacodynamie*, **74**, 90-111 (1947); cf. *C. A.*, **41**, 3212h.].

On the basis of analysis of 160 human cases of barbiturate poisoning (usually barbitol), Donatelli concludes that women are more resistant to the drug than men, and that human beings above the age of 50 are more sensitive than are those from 20 to 49 years of age. The same sex difference is demonstrable experimentally in guinea-pigs and mice, but not in rabbits. The resistance of female guinea-pigs persists in pregnancy, and is accentuated in the puerperium and during lactation. Administration of testosterone or estrogenic preparations to male mice prolongs the duration of narcosis, but shortens the period when given to females. The effect of luteinizing hormone or castration is not clear.

WM. M. GOVIER (Chem. Abstr.).

A Comparative Study on the Effect of Morphine and Chloral Hydrate on Respiration, with Special Consideration to Effecting Recovery of the Respiratory Center Injured by these Drugs by Means of Various Respiratory Analeptics. Matsumoto, Hiroshi. [Acta Schol. Med. Univ. Imp. Kyoto, **25**, 19-44 (1943).]

From studies in rabbits of the analeptic effect of intravenous injection of camphor, cornidine, caffeine, lobeline, atropine, strychnine, picrotoxin, NH_3 , EtOH, and adrenaline on morphine and chloral hydrate narcosis, it is concluded that chloral hydrate paralyzes the respiratory center, while morphine produces a block action.

J. G. YOSHIOKA (Chem. Abstr.).

Toxicity and Hypnotic and Antiepileptic Potency of Acetophenone. Comparative Study of Thienyl Ketones. Quevauviller, Andre (Fac. pharm., Paris). [Ann. pharm. franç., **5**, 16-20 (1947); cf. C. A., **41**, 3868e.]

A comparative study of the pharmacological properties of acetophenone (I), methyl methylthienyl ketone (II), methyl dimethylthienyl ketone (III), and of a mixture of unidentified ketones (IV) (probably ethyl propylthienyl ketones). Toxicity tests gave the following results (doses in gm. per kgm. body weight): maximum tolerated dose (mice), (I) 0.70, (II) 0.10, (III) 0.10, (IV) 0.20; MLD_{100} 1.60, 0.30, 0.40, 0.50; MLD_{50} 1.07, 0.23, 0.26, 0.34 respectively. Replacement of the Ph group of (I) by thienyl groupings increases the toxicity, destroys the hypnotic properties, and produces a depressive action on the respiratory center. At 50 per cent. of the MLD_{50} (I) has a definite antiepileptic action, while (II), (III) and (IV) have only a slight action which, at such subtoxic dose, cannot surely be considered as pure anticonvulsive.

A. PAPINEAU-COUTURE (Chem. Abstr.).

Studies on the Influence of Active Reaction Media on the Action of Narcotics. Lebedeva, N. Ya (Stalingrad Med. Inst.). [Farmakol. i Toksikol., **9**, No. 6, 10-12 (1946).]

In search of causes for intensification by acidity and weakening by alkalinity effects of 8 narcotics were tested on isolated frog heart, perfused with Ringer solution buffered with NaHCO_3 to 3 pH levels (6.4, 7.0 and 7.8). The tests reveal two groups of narcotics: CHCl_3 , narcolan, Et_2O , trional and urethan showed no sensitivity to pH. Barbitol, phenobarbital and amytal were quite sensitive to pH, reaching maximum activity on the acid side. Thus, phenobarbital (1:6,000) decreased cardiac amplitude 83, 46 and 7 per cent. at pH 6.4, 7.0 and 7.8; the corresponding figures at 1:3,000 were 100, 66 and 19 per cent. Sensitivity to pH, shown by barbiturates but not by other narcotics, is attributed to keto-enol tautomerism. These tests confirm the soundness of alkali therapy in barbiturate poisoning.

JULIAN F. SMITH (Chem. Abstr.).

Jacob's Ladder (Polemonium caeruleum) as a Sedative. Tsofina, G. A. [Farmakol. i Toksikol., **9**, No. 6, 45-6 (1946).]

Extracts of Jacob's ladder (I) were given to mice in three series: (1) 0.25-0.75 ml. of 4 per cent. extract; (2) same dose after giving 1 mgm. phenamine (II) in solution, or 0.2 ml. 10 per cent. camphor solution in oil; (3) 0.75 ml. 4 per cent. extract of (I), and 1 mgm. (II) 60 minutes later. The sedative effect was pronounced in each series, with substantial duration, and intensity of results were variable, but favorable enough to warrant further study. Pharmacodynamic properties and mechanism of action also merit attention. The evidence indicates that effects of (I) are only partly attributable to saponins.

JULIAN F. SMITH (Chem. Abstr.).

Comparative Influence of Analeptics on Some Functions of the Central Nervous System. II. Effects of Analeptics after Bleeding. Arbuzov, S. Ya. [Farmakol. i Toksikol., **9**, No. 6, 3-9 (1946); cf. C. A., **40**, 6172².]

Effects of corazole (I), cardiamine (II), and strychnine (III) on reflex time, respiration, and blood pressure were tested with rabbits before arteriotomy. The action of (I), (II) and (III) was intensified by arteriotomy; the minimum effective, spasmodic and lethal doses were lessened, while sensitivity of nerve centers to analeptics was sharply increased. To prevent toxic action, especially by ana-

leptics having spasmodic effects in small doses, a liquid blood substitute should precede the analeptic. The minimum doses (in gm./kgm.) for affecting the latent reflex period before and after arteriotomy were, respectively: (I) 0.005 and 0.0025; (II) 0.01 and 0.005; (III) 0.0001 and 0.0001, given intravenously in each case.

JULIAN F. SMITH (Chem. Abstr.).

Effect of Insulin Hypoglycemia on Brain Glucose, Glycogen, Lactate, and Phosphates. Olsen, Norman S., and Klein, J. Raymond (Univ. of Illinois, Chicago). [Arch. Biochem., **13**, 343-7 (1947).]

The intramuscular administration of insulin to paralysed cats (5 units/kgm. body weight) resulted in most instances in a decrease in brain (whole brain frozen with liquid air) lactate, pyruvate, glucose, phosphocreatine, adenosinetriphosphate and acid-labile phosphate, and there was an increase in adenosine-diphosphate. Plasma lactate, pyruvate and glucose decreased. The most marked chemical changes occurred in the brain after the onset of coma. There was no marked relationship between the degree of chemical change in the brain and the duration and change in the electric activity.

VERNON L. FRAMPTON (Chem. Abstr.).

The Present Status of Tryparsamide in Syphilotherapy. Koteen, Herbert (Cornell Univ. Med. Coll., New York, N.Y.). [Am. J. Med. Sci., **213**, 611-20 (1947).]

A review including consideration of the pharmacology and toxicity of tryparsamide, which is considered a dangerous and inefficient drug.

FERRIN B. MORELAND (Chem. Abstr.).

Pharmacological Studies on Bulbocapnine. I. Extrapyramidal Catatonic Symptomatology in Chronic Experimental Toxicosis from Bulbocapnine. Ottaviano, Giuliano, and Pappalardo, Piero (Univ. Catania, Sicily). [Boll. soc. ital. biol. sper., **22**, 1082-3 (1946).]

The daily injection of dogs with 30 mgm. bulbocapnine/kgm. for 40 days did not produce any noxious effects, but its continued use rendered the animals more sensitive to its action.

II. Blood Sugar after a Single Injection and During Prolonged Treatment with Bulbocapnine. [Ibid., 1083-5.]

A single injection of 30 mgm./kgm. body weight in dogs caused a marked increase in blood sugar, which reached a maximum after 30 minutes. Daily injections of the same dose for 40 days caused a greater increase in blood sugar after injection, and increased the basic values after prolonged treatment.

III. Calcium and Potassium of the Blood Serum of Dogs during Prolonged Treatment with Bulbocapnine. [Ibid., 1085-6.]

A single injection of 30 mgm./kgm. caused an increase in Ca and a diminution in K of the blood with maximum and minimum values, respectively 30 minutes after the injection. Determinations were made by the Kramer and Tisdall method (C. A., **16**, 3688) after deproteinization of the serum with 10 per cent. trichloroacetic acid. The same dose was injected daily, and tests were made every 10 days, 30 and 90 minutes after the injection. Similar results were obtained.

IV. Behavior of the Reticulo-endothelial System during Prolonged Treatment with Bulbocapnine. [Ibid., 1087-8.]

Single or repeated injection of bulbocapnine had no effect on the function of the reticulo-endothelial system.

HELEN LEE GRUEHL (Chem. Abstr.).

Effect of Cocaine on Reflex Activity of the Frog. Gerebtzoff, M. A. (Univ. Brussels, Belg.). [Compt. rend. soc. biol., **140**, 791-2 (1946).]

In frogs subcutaneous injection of cocaine or local application to the brain increases reflex activity. The nervous center responsible is located in the diencephalon.

L. E. GILSON (Chem. Abstr.).

Antiadrenolytic Action of Atropine. Danielopolu, D., and Popa, Gr. Gr. (I-ère Clin. Méd., Bucharest, Rumania). [Bull. acad. méd. Roumanie, **18**, 171-3 (1946).]

By use of a previously reported method (*cf.* preceding abstr.), atropine is shown to have an antiadrenolytic action in addition to its antiacetylcholine action and its antihistaminolytic action. The second of these actions is stronger than the first.

MARSHALL E. DEUTSCH (Chem. Abstr.).

Action of Thiamine Applied Directly to the Cerebral Cortex. Dias, M. Vianna (Inst. Oswaldo Cruz, Rio de Janeiro). [Science, **105**, 211-13 (1947).]

The application of thiamine-HCl solutions to the motor area of craniectomized unanesthetized dogs produced clonic contractions of corresponding muscles. Simultaneous cutaneous stimulation elicited generalized epileptiform convulsions. 2-Methyl-5-ethoxymethyl-6-aminopyridine, 4-methyl-5- β -hydroxy-ethylthiazole, pyridoxine, niacinamide, and ascorbic acid were ineffective.

KARL F. URBACH (Chem. Abstr.).

Influence of Ephedrine on Motor Chronaxia. Sandomirskii, M. I. (Pavlov Inst. of Evolut. Physiol. and Pathol. of the Higher Nerv. Activity, Koltushi). [J. Physiol. (U.S.S.R.), **32**, 511-14 (1946) (*in Russian*).]

Chronaximetric tests were carried out on 12 narcoleptics, 4 neurasthenics, and 6 normal individuals. In 18 of the 24 cases a considerable decrease in rheobase and an 18-66 per cent. shortening of the chronaxia was observed on administration of 50 mgm. ephedrine (I) orally. In 4 cases the administration of (I) led to a 28-45 per cent. increase in chronaxia; in 3 of these the rheobase was slightly decreased. The shortening of chronaxia coincides with a certain increase of cortical excitability, as evidenced by euphoria following (I) administration. The data indicate that the effect of (I) sets in 15-20 minutes after its administration. The changes in chronaxia lasted 1.5-2.5 hours.

H. A. WEGNER (Chem. Abstr.).

Reversal of Pharmacological Action on the Autonomic Nervous System by Doubling the Molecule. Buchel, Leya, Kohler, Denyse, and Levy, Jeanne. [Compt. rend., **224**, 299-301 (1947).]

When injected, 2-p-toloxylethylamine has a vasoconstrictor and hypertensive effect. The double molecule, 2,2'-di-p-toloxylethylamine, when injected, has a vasodilating and hypotensive effect.

W. M. McC. (Chem. Abstr.).

Action of Calcium Administered Intravenously and into the Cerebral Ventricles. Amiragova, M. G. (Inst. Physiol., Acad. Sci., Moscow). [Byull. Eksptl. Biol. Med., **22**, No. 9, 47-50 (1946).]

Intravenous injection of Ca into dogs simultaneously with intraventricular injection causes the same effect as injection into the brain only.

H. A. WEGNER (Chem. Abstr.).

Pharmacological Properties of Iodinated Choline and Brominated Choline. Cullumbine, H., and McDonald, F. F. [Quart. J. Pharm. Pharmacol., **20**, 81-3 (1947).]

The Br compound is 2-5 times as active as the (I) compound. Both compounds behave qualitatively like the other choline compounds, but, on the blood pressure at least, the range between the dose required to produce a muscarine-like effect and that required to produce a nicotine-like effect is small. Pressor doses also depress the respiration.

S. W. GOLDSTEIN (Chem. Abstr.).

Effect of Analeptic and other Substances on Paralyzing Action of Myanesin. Berger, F. M. [Quart. J. Pharm. Pharmacol., **20**, 94-9 (1947).]

The effects of adrenaline, amphetamine, atropine, ephedrine, leptazol, nikethamide, physostigmine, picrotoxin, prostigmine and strychnine on the duration of myanesin paralysis has been investigated in mice. None of the substances had any appreciable effect on the duration of paralysis. The administration of a lethal

dose of strychnine or leptazol to animals paralysed with myanesin prevented the occurrence of convulsions and deaths in the case of strychnine and of death only in the case of leptazol. The duration of paralysis in rabbits was shortened if strychnine was given intravenously immediately after myanesin was administered. The results of these experiments indicate that myanesin causes paralysis by a mechanism different from that of narcotics, anesthetics, and curare-like agents, and offer further evidence to show that myanesin has a selective depressant action on the spinal cord.

S. W. GOLDSTEIN (Chem. Abstr.).

Spinal-fluid Findings in Spinal Anesthesia. Black, M. Gene (Massachusetts Mem. Hosp., Boston). [*Anesthesiology*, 8, 382-9 (1947)].

The spinal fluids of 200 patients were studied to determine the effect of spinal anesthesia. In 75 control cases the spinal fluids were within normal limits. In 60 cases in which the fluid was taken 30 days to 10 years after spinal anesthesia there was, in comparison, a mild increase in protein, chiefly because the interval was less than 3 months in 20 cases. In 40 cases in which the spinal fluid was taken 1-30 days after spinal anesthesia there was a significant rise in protein, tending to indicate that a mild but transient irritation occurs after spinal anesthesia. In 25 cases specimens of spinal fluid obtained before and after continuous spinal anesthesia were examined. Protein variations were negligible, which suggests that the time interval was inadequate for meningeal or tissue irritation to be demonstrated. Spinal-fluid sugar contents in this group presented a marked rise at the end of operation when patients were kept in a horizontal position. This rise may be caused by pooling of the glucose at the site of injection. The Trendelenburg position promotes diffusion; this diffused glucose may promote central-nervous-system metabolism. It is suggested that pontocaine or any similar anesthetic agent used intraspinally may produce transient irritation, the possible exception being the rare individual allergic to the drug. Glucose, when used in conjunction with spinal anesthetic agents and if permitted to diffuse by use of the Trendelenburg position, may be helpful rather than harmful to the tissue of the central nervous system.

RUTH BERGGREN (Chem. Abstr.).